The Chemical Age

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Notes and Comments

Works Maintenance

EVERY works manager knows that maintenance forms one of his most important duties. With all the talk of research and development, with all the schemes for improved business efficiency by reorganisation, and with all the intricate politics of commerce designed to share out whatever work may be going, the fact remains that the most important thing is to keep the wheels going round. Works maintenance boils down to this basic duty. The chemists and the chemical engineers may struggle with the utmost resource of science at their command to produce a great output of goods of the highest quality, but their ability to do so depends completely on the care with which the plant is kept in proper order and up to the highest peak of efficiency.

The daily round of maintenance work is too well known to every engineer to make it worth more than a passing reference here. The steam pipe that must not leak, the boiler that must be constantly inspected, the motor that becomes overheated, the paint that will preserve the exterior of plant and buildings alike from corrosion, the constant stream of fitting jobs that are required—all these are the commonplace of works engineering. Is it always adequately realised, however, that maintenance means far more than this? Maintenance appears to start with the work of the fitters and other tradesmen who keep the plant up to a proper state of repair. Actually, it finishes there and has started far back in the history of the plant. It must always be borne in mind that maintenance costs may be greatly minimised by correct design. Correct design in most instances is not a matter of knowledge, but arises from experience. Experience in turn arises from a thorough knowledge of past failures and successes.

The Stores Testing Department

MANY large firms have a stores testing department in which every article bought is purchased to specification and care is taken that those specifications are complied with. It is, however, impossible to formulate any acceptable specification without a knowledge of the behaviour of the specified material or plant under past usage. An essential duty of any stores testing department must, therefore, be the examination of the causes of failures and the detailed inspection of all plant and appliances removed from service from any cause whatsoever. In those firms that have no stores testing department the work must be done by the regular staff, the works chemist and the engineer.

It is important that a full account should be written of each inspection so made for future reference and it is equally important that the fullest use should be made of the information thus obtained. Opinions differ greatly on what is involved in the term "the fullest use." The causes of defects and failures which lead to maintenance charges may be summarised as coming under five general headings: The use of materials of inferior quality or unsuitable workmanship; poor mechanical or other treatment; careless construction or assembly; unsatisfactory design; faulty installation or usage. Unnecessary labour, material and incidental costs are often difficult to detect without elaborate and costly systems, and encouragement should be given to every man on the plant to bring to notice even the simplest defect. To make the fullest use of all this information, however, it is not in most instances sufficient to keep it to oneself. There is too much of that attitude; knowledge is of little use until it is shared. No one is completely master of all relevant knowledge of any one subject. The man with whom the information should be shared is pre-eminently the man who made the plant.

Plant Manufacturer's Handicap

THE manufacturer of chemical plant is handicapped more than can be readily understood by the lack of knowledge he is permitted to gain of the way his plant has behaved in the past. Once the plant is installed, the plant maker bids goodbye to it for ever. This is not the way to get a better article next time. The maker should be allowed to see the plant in operation frequently and every untoward occurrence should be fully discussed with him. Only in that way can the fullest advantage be taken of the experience gained. There is a feeling that the chemical manufacturer is unwise in doing what is here recommended because information of service to competitors might leak out; because the information so gained would be used by the plant maker to supply better plant to competitors; and because, if the plant happens to be extremely satisfactory, the maker's price might be raised on the next occasion he is asked to supply. All these objections are based on a complete misconception of the work of the plant maker and of the inter-relationship of industries. It is time that this "Hush! Hush!" attitude was relegated to the limbo of outworn Victorianisms.

Having observed carefully all the failures and successes of the plant, and having shared this information with those best able to put it to practical use, the next step is clearly to supervise the buying. We have had occasion before to comment adversely on the non-technical buyer whose only idea of successful buying is

to beat the supplier down in price until no profit remains. A firm of standing will not compete in a Dutch auction, save for some very special reason. There are firms who will do so, and it frequently happens that the buyer deservedly gets what he has paid for and no more.

The Need for Co-ordination

A GOOD article is worth a fair price. " Something for nothing " leads to Carey Street for someone, and no firm wittingly heads for that locality. Buyers should remember this and the next time engineers have reason to complain of poor quality, among other things they should demand the entire history of the purchasing transaction. Not infrequently a buyer is to blame for high maintenance charges. One of the difficulties in facing this aspect of maintenance lies in co-ordination. The chemical industry has developed in the same way as all large modern industries, namely, towards ever-increasing specialisation. The rapidly accumulating technical knowledge makes this inevitable, but unfortunately it also leads to a division of responsibility between an executive staff with a limited amount of knowledge on a wide range of subjects and a specialist staff with extensive knowledge of a limited range of subjects.

Investigations leading to the discovery of technical faults are not in general conducted by the engineer who is responsible for the maintenance of the works. Neither of these departments may have any say in the buying. Maintenance of works is deeply rooted in co-ordination between the several departments. This is all the more important since an unsatisfactory plant cannot usually be scrapped until it has been operating for some years and high maintenance charges have to be faced until much or all of the first cost has been written off. Important as is the work of the maintenance engineer, his is but the result of much that has gone before, and he may save himself a deal of trouble by paying attention to this aspect of his work.

Hazards of the Chemical Industry

SOME of the everyday and some of the more unusual accident hazards of the chemical industry are revealed in the 1934 accident reports to the Chemical Section of the United States National Safety Council. In several instances, the remedies have been described by the council members. Steel drums which have contained caustic soda are cleaned with hydrochloric acid in one plant. " A chemical reaction is, of course, set up and the hydrochloric acid becomes a neutralising agent. However," the member wrote, " if an excess of hydrochloric acid is used, it has an action upon the iron in the drum in which the hydrogen is released and the chlorine combines with the iron and becomes iron chloride. In this particular case, the hydrochloric acid stood for some time instead of being washed out immediately with water. When an extension cord light was inserted in the bung-hole to inspect the interior of the drum, the bulb was broken and the hydrogen was ignited. The resulting explosion severely injured the operator about the face and neck. A vapour- and shock-proof light would have prevented the accident. Also drums should in all cases be washed out with water before inspection."

A milk bottle containing creosote and caustic soda solution was left standing on a shelf in a locker room. A workman seeing it and thinking it was a bottle of coffee, started to drink it. He suffered severe burns of the mouth. As a general rule, most chemical plants forbid the use of milk bottles except for containing milk. A workman handling sodium bichromate dust (at first without a mask) noticed a bleeding of the nose with the formation of a scab in the left nostril from time to time. When a boy, he had suffered a blow on the nose to which the doctor attributes an ulcer in the left nostril. This condition, the doctor believes, was aggravated by the sodium bichromate dust. A workman was sitting on a four-inch line about ten feet above the ground in front of a trap discharge header on which he was working. A trap " dumped " and discharged steam and hot water against him. His right arm, thigh and leg were scalded. Steam, it was pointed out, should be shut off and all traps should be disconnected from a header before beginning work on it.

Some Obvious Precautions

AN employee was loading dirt in a wheelbarrow at the basement level of a new building. Nearby, an employee of a sub-contractor was throwing short pieces of three-inch pipe from the third floor level to the cinder floor of the building. One piece of pipe, however, struck another piece lying on the ground. It bounded end over end towards the employee in the basement. He knew the pipe was being thrown and tried to dodge the piece, but one end struck a column, throwing the other end around in such a manner that it struck him on the head. He suffered a fracture of the skull, which later proved fatal. To avoid such accidents, it was suggested, enclosed chutes should be built for the handling of material from upper levels. The chute discharge should be so located that the material coming from it will not expose or strike persons, structures, or equipment.

The fire chief of a large plant was discharging a fire extingusher during the annual recharging of all fire extinguishers. The extinguisher in question was of the usual soda-acid type. Suddenly, while the fire chief held the extinguisher in the inverted position necessary to discharge it, the cap flew off and the cylinder was projected. It struck him in the chest. When he recovered consciousness, he found that he was considerably bruised and had suffered the fracture of three ribs. An inspection of the extinguisher revealed that the rubber gasket had been replaced by a gasket fashioned from thick, hard, inlaid linoleum, and that the thickness of this home-made gasket prevented the threads of the cap from engaging safely. Other extinguishers were examined and found to contain similar makeshifts. Employees who are entrusted with the recharging and maintenance of fire extinguishers should be instructed and supervised to make certain that this and other important features of fire extinguishers are given proper attention, it was suggested. An operator had finished cleaning a vessel fitted with an agitator. As he emerged from the manhole, the handle of his broom caught on the belt and forced it into the tight pulley of the agitator drive, thus starting the agitator. This motion of the agitator caused the man to lose his balance and fall back into the vessel. He struck his left shoulder, arm, and the back of his head and the agitator pushed him around in the vessel. His injuries consisted of a facture of the shoulder blade, bruises and a scalp cut. He missed severe injury or death by a slight margin.

Jubilee of City and Guilds Institute

Professor H. E. Armstrong wants Engineers Properly Trained in Chemistry

PROFESSOR H. E. ARMSTRONG, speaking on February 4 at the celebration of the jubilee of the City and Guilds of London Institute, Central Engineering College, South Kensington, made a strong and outspoken appeal for the reconstitution of the College as a separate entity, holding, as he does, that engineers are a sufficiently large and important class to deserve and receive the special consideration they need and that engineering is full of special problems for the chemist.

A Rip van Winkle returned from the mountains, he said, I have never been in a more difficult situation, with so much to say and so little time to say it in, looking back as I can over full 70 years of scientific advance—beyond question the most marvellous period in the history of the world. Excepting the needle telegraph, everything electrical has happened in my time. We have learnt to use iron everywhere in place of wood and stone, especially in shipbuilding. Unfortunately, too, we have learnt to fly, in air, upon land and upon the waters. The engineer has been made pre-eminent. Have the Guilds of London done a good or an evil thing in so greatly furthering his progress? Have they, has any educational body, sufficiently considered man's other needs, in particular the spiritual, in any way taught him to know himself even as a machine?

The Imperial College is sprung up from English soil, but was largely made in Germany, in days when intellectual ability and freedom of thought were held in highest esteem in that country and gave it its great repute.

Progenitors of the College

Lyon Playfair and Prince Albert are to be regarded as the progenitors of the College. It may be said to have begun in the Geological Survey. Playfair was a student in Glasgow in 1835-36 under Thomas Graham, and followed him to London as his private laboratory assistant at University College. He afterwards studied under Liebig at Giessen. He became attached to the Museum of Practical Geology, the home of the Survey, about 1843. In 1842-43 he personally conducted the great Liebig on a tour throughout England to explain his new doctrine of chemical manuring. Liebig aroused the greatest enthusiasm among landowners and farmers. Playfair and his friends, including the Queen's physician, Sir George Clark, took advantage of the opportunity to raise funds for a school of chemistry. So it came that the Royal College of Chemistry was built in Oxford Street. This was opened in October, 1845, in charge of Hofmann, who had been an assistant to Liebig; his services were secured, in large measure, through the offices of Prince Albert. Hofmann became the father of coal-tar chemistry, working on the foundation laid by Faraday, at the Royal Institution, by his discovery of benzene in 1825. The great dyestuff industry, in fact, had its origin in London in one of your constituent colleges—your buildings should stand out in rainbow colours.

Frankland's First Pupil

To carry out his work at Jermyn Street for the Survey, Playfair engaged two assistants—one from Germany, Herman Kolbe, who had studied under Wöhler and had then assisted Bunsen; the other, a young Lancashire man, Edward Frankland (1846-7). Kolbe carried off Frankland to Germany in 1847, where he worked first in Bunsen's and then in Liebig's laboratory. In 1851, Frankland was elected first Professor of Chemistry in Owens College, Manchester. He succeeded Hofmann at the Royal College in 1865. I was his first pupil.

Playfair was largely concerned as a scientific adviser to Prince Albert in the great 1851 Exhibition in Hyde Park, now the Crystal Palace. The School of Mines was established in this year as an adjunct to the Geological Survey. Playfair was the first Professor of Chemistry, having as colleagues Huxley, Tyndall, Ramsay and Percy. Playfair migrated to Edinburgh in 1853 and Hofmann became his successor: in other words, chemistry passed to Oxford Street. While at Oxford Street I attended Huxley, Tyndall and Ramsay's lectures at Jermyn Street—but I rebelled against examinations even at that early date, so I have never been recognised by the school.

Tyndall was incomparable as a teacher—he made Sound and Heat live. Yet you have never honoured him nor his successor here, Guthrie. These two were the greatest teachers of fundamental physics our country has known. We need to recover their breed. Now physics is on stilts.

The Royal College of Chemistry wandered up here in the seventies, to be followed by the Royal School of Mines. Then the Natural History Museum was built; quite recently, the stones have been carted from Jermyn Street to this Dunsinane.

Playfair's services to South Kensington do not end here. He was active in promoting the erection of the Brompton Boilers, now the Victoria and Albert Museum; in the establishment of the Science and Art Department, destroyed by Sir Robert Morant, who was an enemy of science, in the course of his lightning career; finally, in founding the 1851 Exhibition Scholarships. There is no monument, so far as I am aware, to the great "little man," whose shadow may be said to cover the whole of South Kensington's scientific activity. One thing one learns by growing old—that to-day has no thanks for yesterday. How much does London know and care for the great treasure in its S.W. division? These things are never told in connection with the Albert Memorial. The 1851 Exhibition marked the beginning of our loss of the commercial supremacy we had so long enjoyed: we displayed our methods to the world and then made money by making machinery for the world to use in copying us. We need to go back to 1851 for the primary cause of the activity displayed by the Guilds of London on behalf of education five-and-twenty years later. Only Playfair's Science and Art Department had prevented us from noticing our lack of forethought in education.

The higher chemistry was almost sterile in England when I began work in 1865, compared with the conditions abroad. When, after the 1870 Franco-Prussian war, the German chemists and engineers went full speed ahead, we were impotent as their competitors. We were in dull commercial hands. I believe the City Guilds may claim to have turned the tide—but only slowly. Why? Is it not because commerce was and still is insufficiently educated to grasp the changes, due to the application of scientific method, brought about by engineering science almost everywhere, except in commerce?

Our Greatest National Need

To-day, the greatest of our national needs is in no way considered—Agriculture. When the Royal College of Chemistry was opened, its rural promoters had looked forward to its being developed in the interests of agriculture. Man may propose, but Professors dispose—nothing was further from Hofmann's genius.

We have never yet had a Professor of Agricultural Chemistry worth his salt—the subject is nowhere taught in our country in a way in the least comparable with that in which engineering has been taught in the Guilds Colleges.

I venture to express the hope that by the time the College of Chemistry celebrates its centenary it will have learnt what its original purpose was, and will seek to fulfil this. By that time, perhaps, the world will recognise that no other subject is so worthy of chief attention as is agriculture.

I find the story that is put into our hands of the foundation of the Central amusing reading—there is so much to be read in between the lines to make it history. History can only be written by those who have made it—only then if they have sufficient command of documentary evidence. Is it not to be supposed that a sudden exposition of educational fervour came upon the City Fathers about 1875. A certain mild excitement had set in long before. Manchester, in 1851, had begun to think that it could not get all it wanted from Oxford and Cambridge and started the Owens College. Then came the Science and Art Department, to which I have referred. After a long interval, Bristol, then Leeds, followed Manchester's example.

Commerce was at the back of the movement. Complaint was rife that we were being badly beaten in business, especially in textiles, dyestuffs and engineering. In London,

the City Fathers were seriously perturbed by the threat of inquiry into their finances. The wise ones saw that it would be well to be up and doing to prevent this. I think Owen Roberts, Clerk to the Clothworkers, was probably the leader—he already had experience at Leeds, which from the beginning was generously helped by his company. The Goldsmiths and the Drapers were very active. Sir Frederick Bramwell and Sir Frederick Abel were specially helpful. So it came that the City and Guilds of London Institute for the Advancement of Technical Education was brought into being. No one knew what was implied in "Technical Education."

From the beginning the Institute had two parties—one, numerically the larger, was all for the City; the other, for South Kensington. The City boat took the water six years ahead of the more pretentious West-end craft, but determined the course of the latter. By some strange accident, Ayrton and I were given a pair-oar gig, but not even sealed sailing orders. After a year or so we changed into a canoe, with Perry as a third paddle; then Magnus jumped in and thought he could cox us. There was a good deal of confused paddling until he learnt that we meant to steer our own course. I wish we had all kept circumstantial diaries and could give a complete history of the entrancing experiences we had up to 1883, in exploring the creeks of workshop training—it was for us a period of real exploration in education. If teachers could only see it they would find that there is great fun to be got out of experimental teaching.

An Almost Uncharted Sea

Neither Huxley nor any one else told us what to do: in fact, we had to open up a new "City passage" across an almost uncharted sea. In so doing we discovered an all-but-new method if not a principle. The three of us became bent on making our students, if possible, learn to think for themselves; to use their heads, in fact, not merely take notes. During the four years before the opening of the Finsbury building, the three of us hammered out the course adopted there. I claim to have given it shape by insisting on a course for chemists which would involve something more than mere chemical training: particularly on the inclusion of the elements of mechanical engineering; equally I insisted on the inclusion of chemistry in the engineering course. I claim to have been the true and first inventor of the chemical-engineer—The Society of Chemical Engineering, however, has never recognised this. I also worked out a laboratory course which involved training students in the art and practice of original inquiry—not as a course for a final year, but from the beginning. I brought this under notice in 1884, in this building, at the time of the Educational Conference held during the Health Exhibition. I brought my system here and used it for five-and-twenty years.

You have been told that Henrici, Unwin and I were first appointed, Ayrton at a later meeting. This was because Oliver Lodge had been first approached. He decided to remain in Liverpool. I have often wondered what difference his appointment would have made. Electricity would have been taught less practically but more theoretically; the College might have been made a centre for Electrical Research, perhaps "Wireless" would have been developed here. I began to work with Lodge, outside our College, in 1885. I think we should have been drawn closely together by common interests had we been colleagues.

Circumstances, no scheme, determined the character of the Central. We were the first public College to offer a considered compulsory course to engineers. We soon attracted a high class of student, prospective engineers. Money running short in the City, no attempt was made to go further: we became an Engineering College and so were able to make a clean-cut experiment. In the first session, when expansion was under discussion, I advocated the appointment, as assistant Professors, of the late W. H. Perkin, Junr., and of Orme Masson, who has done such wonderful work in Melbourne, Australia. If the three of us had got together in those days we might have made chemistry hum. At that time it was at a low ebb in England: the tide was just beginning to rise. We started a new type of chemist—one who was not only able to work with engineering colleagues but also of higher culture than the ordinary chemist: Crystallography was made compulsory. We raised a Prime Warden for the Goldsmiths Company. I have never had any thanks for this: perhaps he has been found to know too much.

For various reasons we had few chemical students. I did not merely bow my neck to fate but became deeply interested in the impossible task of raising the intelligence of the engineer to a chemical level. I made no attempt to teach him chemistry: that I soon found to be impossible. I tried to teach him, through simple acts of chemical inquiry, to experiment with a purpose; to observe accurately; above all, to describe his work in lucid English; to take notes, in short, the hardest task of all. My schoolmastering was not popular with many at the time. In after years I have had my full reward, as not a few have told me that my insistence on their learning to help themselves has been of special value to them.

The greatest cross I have had in life came in 1911 when the Central was degraded merely to engineering. The change was made without any of us being consulted. My course, which had proved to be of special service, was destroyed. Students were turned over to the tender mercies of the Royal College of Science, where they received the treatment meted out to students of professional chemistry. The Central engineering course lost its special value. Engineers are a sufficiently large and important class to deserve and receive the special consideration they need: engineering is full of special problems for the chemist.

Work of National Importance

The City and Guilds Institute can, without doubt, be said to have accomplished a work of the greatest national importance and to have truly fulfilled its original purpose—apart from the equally important work done at Finsbury—by establishing not only the first public Engineering College but a type of College as yet unrivalled and unimitated: giving education of a class hitherto attempted nowhere else, with careful consideration of the particular needs and intellectual character of its students.

At this, perhaps the most critical and solemn moment of my life, in the interests of our national engineering efficiency, I would plead for the recovery of the original spirit and a reconstitution of the College as a separate entity. You will need to include some geology and biology. The building given over to needlework, which is now free, might well be made into efficient laboratories for the special chemistry and physics that engineers need. Up and down the country, teachers everywhere are teaching only their own special subjects, each prepared to let the devil take others. No attempt is being made to apply scientific method to teaching: examinations curb all freedom. The need to-day to place education upon a rational footing is far greater than it was when the Guilds sixty years ago first set themselves in action. Everywhere it has been made ultra-professional. In all its branches it has to be reorganised and humanised. May the Holy Spirit once more descend upon the City and imbue it with the desire to give national assistance by returning to its former charge.

Rubber Market Review

Growing Trade

FOR the first time for many years the annual rubber market review, issued by Charles Hope and Son, of Mincing Lane, shows cause for optimism. During the latest forty-six months the price has remained under 6d. per lb.; the average price for last year was 6.1875d. Shipments in 1934 were greater than during any previous year, being 1,011,000 tons. The restricted area accounted for 980,000 tons, other sources, including French Indo-China, for the balance of 31,000 tons, the latter figure being only 3 per cent. of the total. Consumption in 1934 was 925,000 tons, an increase over 1933 of nearly 15 per cent. The amount of reclaimed rubber manufactured has remained at about the same ratio to the consumption of plantation rubber. Stocks in the United Kingdom, United States and Malaya during 1934 have increased by 55,000 tons, the United Kingdom accounting for the greater part of the increase. The figures show the Regulation of Shipments Scheme to have been entirely successful, shipments from the unrestricted areas representing only just over 1 per cent. of the world total during the seven months. Synthetic rubber is being made in Germany and Russia but not as a commercial proposition. Automobile production in the United States and Canada has rapidly recovered, a further big increase is likely. Production in 1935 entirely depends on what percentage of the basic quota is permitted, but consumption in 1935 should show no falling off, and a further increase is expected.

The British Industries Fair, 1935

THE Department of Overseas Trade announces that the British Industries Fair, which opens next Monday, will be the largest ever held in London. The total area actually covered by exhibitors will exceed 525,000 sq. ft., compared with 480,000 sq. ft. in 1934, which was the biggest Fair to date. In addition to occupying every square foot of suitable exhibiting space at Olympia, the exhibiting area occupied by the textiles section and the furniture section at the White City both break all records for the Fair. There will be bigger displays of goods, compared with last year, in sixteen of the twenty-four sections of the Fair held in London. The space occupied by the chemical section is 10 per cent. greater than last year and that of the plastics section is 28 per cent. greater. Practically the whole of the indoor exhibiting space in the engineering and hardware section at Birmingham (265,000 sq. ft.) has already been booked up although that section of the Fair does not open until May; and about 80,000 sq. ft. of exhibiting space out of doors at Castle Bromwich is now booked or under negotiation. The two chief speakers at the Mansion House banquet on the occasion of the opening of the Fair, on Monday, will be the Earl of Derby, who will propose the toast of "British Industries and the British Industries Fair," and the Rt. Hon. Walter Runciman, President of the Board of Trade, who will respond. Colonel John Colville, Secretary to the Department of Overseas Trade, will propose the toast of the Lord Mayor.

According to the official Board of Trade figure the exports of chemicals, drugs, dyes and colours during 1934 amounted to £19,565,890 as compared with £18,567,696 in 1933 and £18,539,350 in 1932, or an increase of £998,194 and £1,026,540 in the two years respectively. The position in regard to imports of this class of materials was not quite so satisfactory, an increase of £1,352,646 being reported, from £9,923,496 to £11,276,142. Although about £600,000 of this increase is represented by non-competitive materials such as boric acid, calcium carbide, potash salts, etc., together with many other chemicals which are virtually raw materials for British makers and to that extent are encouraging, the import of competitive products has also increased in many cases, despite the additional duties imposed on certain of them. This is a serious situation which is receiving attention from the manufacturers concerned. The chief increases in the imports are £500,000 from Germany and £221,000 from the United States.

In the more recent trade agreements, such as those with Finland, Lithuania, Latvia and Estonia, certain buying agreements for chemicals between organisations in each country have been included. It is hoped that these will prove more beneficial than previous treaties which have dealt solely with tariffs on an m.f.n. basis.

Exhibits in the Chemical Section

The use of chemical products is so widespread that any improvement in industry generally is quickly reflected in the demands for chemicals and, in spite of fears expressed to the contrary, there is no sign yet that saturation point has been reached in either home or export markets. The results of this increased activity have been seen in some cases in the actual lowering of prices due to an increase of production, notable examples being coal tar products, particularly crude tar, borax, copper sulphate and lead acetate.

As regards developments during the year, the hydrogenation plant of Imperial Chemical Industries, Ltd., at Billingham is approaching completion, while new coal oil plants based on low-temperature processes are being erected, one of particular importance being in Scotland. Considerable activity in many branches of the industry is foreshadowed by the formation of new companies, some of them to work new processes, particularly in the field of fuel and oil.

It is impossible to refer to all the important advances made during the year, but mention may be made of a new process for the recovery of sulphur from waste gases, the manufacture of chlorinated rubber, the development of new resins, particularly for entirely novel purposes, the issue of a joint set of authoritative standards for laboratory chemicals by two prominent firms of fine chemical manufacturers, the introduction of sodium metaphosphate for water treatment purposes and the issue by the British Standards Institution of a series of standard specifications for cellulose solvents.

The Chemical Section of the British Industries Fair, which is again under the auspices of the Association of British Chemical Manufacturers, is in the same position as last year, in the front of the Main Hall. The Association has an office on Stand No. A.49 in the Section, where literature will be distributed and inquiries answered as to sources of supply.

Among new products may be mentioned sodium metaphosphate. This product has made extraordinary progress in the laundry and textile industries as an inhibiter of the formation of lime soaps and also as a water softener. Its special feature is its action towards calcium and magnesium salts, whereby it softens hard water without forming a precipitate and also maintains in solution normally insoluble salts of these metals. Twelve months ago its possible uses had practically not been envisaged at all.

Among other new products that have been placed on the market since the last British Industries Fair are cinnamic aldehyde, edible lactic acid, methylcyclohexanol phthalate, cyclohexanol stearate, enzel and methyl enzel.

What to see in the Chemical Section

Albright and Wilson, Ltd.

Stand No. A.102 and A.103

PHOSPHORUS in stick form, and amorphous and sesquisulphide of phosphorus for match making, are the attraction at this stand. The important compounds of phosphorus, such as oxychloride and trichloride, are on view. Pure and technical phosphoric acids and the many phosphate salts have a prominent place, particularly the pure food phosphates—acid sodium pyrophosphate, sold under the trade name of "Antelope," and acid calcium phosphate, 80 per cent., universally known as "Ibex." In the bakery trade, "Antelope" is used as a high-grade raising powder, in conjunction with bicarbonate of soda. "Ibex" phosphate, 80 per cent., is used as a flour improver and as a raising agent for self-raising flour.

A notable new addition to the sodium phosphate range is afforded by sodium hexa-metaphosphate. During the last twelve months, great progress has been made in the manufacture and application of this salt in the textile and laundry industries. It is better known to the trade as "Calgon," under which name it is sold in this country by Keith Piercy, Ltd. Its remarkable property of softening water without the formation of a precipitate has led to its use as an inhibitor of the formation of objectionable lime soaps in certain processes in the laundry and textile industries.

Di- and tri-sodium phosphate are exhibited in several forms. The tribasic salt should be noted for its appearance and free-flowing property. The hydrates are now well known in this country, but it is anticipated that the anhydrous salts will be of very considerable interest. Their economy and saving in freight make them especially attractive for export. Other important salts of ortho phosphoric acid are also on view, notably ammonium, potassium and magnesium ammonium phosphates.

Albright and Wilson, Ltd., are the only British manufacturers of carbon tetrachloride, an important member of the chlorinated hydrocarbon group of non-inflammable solvents. It enjoys an extensive use for dry-cleaning purposes, where its non-inflammability, stability and high solvent action make it an ideal product. It is also recommended as the safest and most suitable "spotter" for domestic use. Its value as a fire-extinguishing agent and as a rubber solvent are well known.

British chlorate of soda is a line which was shown for the first time at the British Industries Fair last year. It is actually manufactured in one of Albright and Wilson's associated companies' works in Canada and is being marketed in the British Empire by Clifford Christopherson and Co., Ltd., who are closely associated with Albright and Wilson, Ltd. The sales of this product have made considerable pro-

gress in that short time, particularly for weed killing purposes, and it is anticipated that its efficiency and safety will be big factors in causing an increase in its popularity with the amateur gardener.

A. Boake, Roberts and Co., Ltd.

Stand No. A.95 and A.96

FLAVOURING essences, food colours, food preservatives, and chemicals for foodstuffs as supplied by this firm are all guaranteed to conform to the Sale of Food and Drugs Act, Public Health (Preservatives, etc., in Food) Regulations, 1925, and all others in force in this country. More prominence is given this year to essences and extracts for flavouring purposes and there is a special display of "Drydex" flavours, in view of the readiness of their acceptance both in this market and abroad. These flavours fulfil a long-felt want of the makers of flavoured food products in powdered form.

A varied range of fine chemicals, essential oils and intermediates includes several of great importance of which this firm is the only manufacturer in the country. The following are of particular interest: Musk ambrette, musk ketone, musk xylol, phenyl ethyl alcohol, amyl cinnamic aldehyde, benzophenone, geraniols, citronellol, citronellal, ethyl aceto acetate, ethyl sodium oxal-acetate, heliotropin, acetins, ethyl phthalate, ionones, iso-eugenol, linalyl acetate, synthetic menthol.

The quality of terpeneless oils in the past has been such that there has been little use for them in the highest quality products, in spite of the many advantages they should confer. A. Boake, Roberts and Co., Ltd., are now offering a number which have been prepared by a new process and their success has been immediate amongst those users who can afford to pay the price for such high quality materials.

At this stand there is also a display of perfume bases for use in scents, soap, bath salts, creams, brilliantines, dentifrices, lotions, cosmetics, disinfectant sprays, etc., and materials for covering the odours of oils, fats, waxes and solvents; magnesium stearate and zinc stearate for cosmetic purposes are shown.

Solvents, plasticisers, gums and resins, chiefly used in the preparation of cellulose nitrate and cellulose acetate lacquers, plastics and moulded products, also in the paint and varnish trades and in printing inks, cover a wide range. Particularly worthy of mention are butyl acetate, amyl acetate, ethyl acetate as solvents, tricresyl phosphate, dibutyl phthalate, as plasticisers, and glycerine resin esters (ester gums) and glyceryl phthalate resins (glyptals). In addition to these products which are of such importance, there are shown many others which are of particular value in specific instances.

Metallic acetates, formates, oleates, stearates, linoleates, palmitates and resinates for use as driers, are guaranteed to contain a definite metal content and can be supplied both in the fused and the precipitated form.

Among other products are cobalt derivatives (linoleate resinate, acetate, oleate, stearate and ricinoleate); liquid sulphur dioxide, sulphites, bisulphites and hyposulphites (photographic); various grades of phosphoric acid and a wide range of phosphates.

This firm are the sole distributing agents in the United Kingdom and Irish Free State for acetic acid of all grades and strength and carbon black as made by Shawinigan, Ltd., in Canada.

The British Drug Houses, Ltd.

Stand No. E.81

THE range of products manufactured by the B.D.H. is so extensive that it is not practicable to display more than a small proportion of them. The exhibit is therefore confined to selected products of outstanding importance and these illustrate the diversity of the company's activities. Visitors will observe, on the one hand, a wide range of pure chemicals issued for medicinal and pharmaceutical purposes, and, on the other hand, a selection of laboratory chemicals which are supplied for general scientific use.

Purified vitamin A is prepared by a special process which is the subject of a B.D.H. patent, and is the purest vitamin A hitherto marketed. This vitamin is issued for therapeutic purposes in the form of various standardised preparations, notably Avoleum and Radiostoleum (which also contains vitamin D), and it is also contained in combination with vitamins B_1, B_2 and D in Radio-Malt. The pure crystalline vitamin D (Radiostol or Calciferol) is issued for therapeutic purposes as Radiostol solution and Radiostol pellets and is also contained in Radiostoleum and Radio-Malt.

Pure vitamin C (ascorbic acid B.D.H.), in crystalline form, is issued for therapeutic purposes.

Amongst the hormones exhibited may be mentioned oestrone, the pure crystalline ovarian follicular hormone, issued for therapeutic purposes under the name "Oestroform," and Progestin, the corpus luteum hormone, is also available for therapeutic use. Insulin, thyroxine, di-iodo-tyrosine acetate, di-iodo-thyronine, acetylcholine bromide, pituitary extract and liver preparations are also shown.

Other medicinal chemicals exhibited are substances such as pure glycine (amino acetic acid), phenolphthalein of incomparable purity; cinchophen; hippuric acid and hippurates; alkaloids, such as ephedrine, ergotoxine, atropine, pilocarpine and their salts; citrates; sodium antimonyltartrate, in a specially pure form suitable for injection; barium sulphate, for X-ray work; tetraiodophenolphthalein, for use in cholecystography; the symmetrical ureas, such as antrypol and S.U.P. 36; contramine; medicinal dyes, such as acriflavine, proflavine, euflavine, auramine, brilliant green and congo red; and many other interesting substances, such as manganese butyrate, disoxyl, ethyl chaulmoograte, sodium chaulmoograte and sodium morrhuate.

The fact that the company's activities are by no means limited to the production of articles for medicinal use is aptly demonstrated by the inclusion in the exhibit of products for scientific purposes. Amongst these are pure chemicals for research and analysis. Under this category are shown examples from a wide range of organic and inorganic chemicals for laboratory use. Included are examples from a range of 220 chemicals characterised by the word "AnalaR" and guaranteed to conform to the specifications for purity published in the book of "AnalaR Standards for Laboratory Chemicals" as formulated and issued jointly by The British Drug Houses, Ltd., and Hopkin and Williams, Ltd. The exhibit also contains examples of indicators, microscopic stains, micro-analytical reagents and outfits designed to facilitate various tests in biochemical work.

W. J. Bush and Co., Ltd.

Stand No. A.100

A VERY large range of products is shown at this stand, first and foremost being the flavouring essences, essential oils and food colours, both natural and artificial, with which they have built up a world-wide reputation. There is also shown a very wide range of fine chemicals, the principal ones, to mention only a few, being vanillin, coumarin, heliotropine, benzyl alcohol, benzyl acetate and benzoate, benzophenone, phenyl ethyl alcohol, ionone (alpha, beta and 100 per cent.), benzoic acid, B.P. 1932, and sodium benzoate B.P. 1932, geraniol and citronellol and their esters, terpeneless oils of lemon, limes, orange, peppermint, etc.

The latest products made by W. J. Bush and Co., Ltd., are cinnamic acid and cinnamic aldehyde, methyl and other cinnamic esters, together with hydroxy-citronellal. For the first time cinnamic aldehyde of British manufacture is available. In the perfumery materials section, concretes and absolutes of rose, mimosa, jasmin, tubereuse, jonquil and Mousse-de-Chine, as well as compounded ottos ready for use by the discerning perfumer are exhibited.

The Gas Light and Coke Co.

Stand No. A.78

STANDARD grades of road tars are shown at this stand. No. 1 Becspray, No. 2 Becgrout, and No. 3 Becmac, are tars that conform to narrow specifications which are within the limits of the British Standards Institution Specifications. For the production of tar concrete, the company offers Beccrete as a speciality. The company has a well-equipped testing laboratory where a prospective user may learn how his proposed mixture responds to tests for stability, compression, tension, attrition (by sand blast) and indentation (by loaded wheel sectors). Bectaphalt is a tar bitumen compound specially prepared for surfacing and grouting. The company's tar emulsion, Becmulse, is also exhibited

Coal tar pitches, both to buyers' and to standard specifications, are available in a range from the softest to the hardest types. Besides these products useful to the road-maker, an extensive series of tar products is shown, including creosote,

fuel oil, carbolic acid, naphthalene and other hydrocarbons. In addition, samples of yellow prussiate of potash and prussian blue are exhibited. It is interesting to note that many chemicals from a modern gasworks are used in the manufacture of plastic materials; these chemicals include phenols, cresols and xylenols.

The General Chemical and Pharmaceutical Co., Ltd.

Stand No. A.48

THIS exhibit is directed primarily to indicating the extent to which the whole field of general laboratory chemicals is covered by the company's Judex products. Widespread interest was attracted by the initiation, in 1927, of the commercial manufacture in England of a series of organic reagents which were specific to certain metals or small groups of metals. The range of these so-called " special reagents " has, since 1927, been extended considerably and the company's name has been very prominently associated in the public mind as pioneers in the commercial manufacture of that class of product. Examples of such reagents are again exhibited, but the display is intended to remind visitors that those " special reagents " represent only a very small part of the company's activities in fine chemical manufacture.

Since last year's British Industries Fair, important developments and expansions have taken place in manufacture, and particularly in the direction of improved methods of analytical control at all stages. The company's policy of improving continually the standard of purity of analytical reagents has had an important bearing on the volume of its export trade, Judex reagents now being recognised as being in many instances of definitely higher purity than the corresponding products of Continental manufacturers.

Other exhibits at this stand include Oasis accumulator acid, potash lithium electrolyte for nickel-iron batteries, dipping acid and pure sulphuric, nitric and hydrochloric acids for industrial uses.

Hopkin and Williams, Ltd.

Stand No. A.99

THE exhibits at this stand draw special attention to the " AnalaR " laboratory chemicals manufactured by the company. Regret has frequently been expressed at the absence, in this country, of a single authoritative published standard of purity for chemicals employed as analytical reagents or in other critical scientific work. Accordingly, The British Drug Houses, Ltd., and Hopkin and Williams, Ltd., have combined their knowledge and experience and have produced a new volume entitled " 'AnalaR' Standards for Laboratory Chemicals." This book provides chemists with a revised and up-to-date series of specifications for laboratory chemicals which are sold by, and carry the guarantee of, both firms under the trade-mark " AnalaR." In the preparation of the specifications full advantage has been taken of recent advances in analytical practice, and many new and delicate tests have been devised. Some of the former "A.R." specifications have been made more stringent, others have been more accurately defined.

Simultaneously with the introduction of these new standards of purity, a modern and improved type of container for the chemicals has been adopted. This consists of an amber glass bottle, closed by a neat moulded screw cap, which combines the advantages of tight closure and quick and easy removal. The label also has been redesigned and now carries a statement of the formula and molecular weight of the substance, the percentage content of active material (where applicable) and the maximum limits of impurities.

Howards and Sons, Ltd.

Stand No. A.98

HERE is shown a steadily extending range of solvents and plasticisers, consisting of many derivatives of cyclohexanol, ethyl lactate, diacetone alcohol, acetal solvent and dipentene. Two of the most important solvents, Sextone B (methylcyclohexanone) and ethyl lactate, are now being produced in still higher qualities, especially as regards the ketone content of Sextone B. A special feature of the exhibit concerns new solvents and plasticisers for special purposes. The new plasticiser, Sextol phthalate, is of special interest in connection with synthetic resins. Another plasticiser, Sextol stearate, is finding many important new applications in the paint and lacquer trades.

This year there is an extension of exhibits illustrating the uses of Howards and Sons' products, particularly with regard to the lacquer, paint and textile trades.

For over 136 years Howards and Sons have been pre-eminent in the manufacture of high-class fine chemicals and their stand shows specimens of aspirin, bismuths, bromides, camphor, ethers, lactates, calomel, cinchona salts, Epsom and Glauber salts, citrates, magnesias, iron salts, hydrogen peroxide, iodides, mercurials, menthol (synthetic), quinines, soda bicarbonate, salicylates, thymol and isopropyl alcohol.

Imperial Smelting Corporation, Ltd.

Stands Nos. A.46 and A.47

AT this stand are displayed the productions of The National Smelting Co., Ltd., Orr's Zinc White, Ltd., Fricker's Metal and Chemical Co., Ltd., The Delaville Spelter Co., Ltd., The Northern Smelting and Chemical Co., Ltd., Improved Metallurgy, Ltd., National Alloys, Ltd., and Cuprinol, Ltd. Products include lithopones, zinc sulphide, zinc oxides, leaded oxide, sulphuric acid, white barytes, zinc dust and cuprinol.

The production of zinc and sulphuric acid is the main purpose of the corporation. The new plant for the production of high-grade zinc is now in full operation. This plant, together with the refining unit, renders possible the production of a metal with a zinc content of 99.99 per cent. This achievement has opened up fresh possibilities for an extension of the practical uses of zinc.

The lithopone plant at Widnes has been extended and improved and these works are now in a position to supply every grade and strength of lithopone for the paint and rubber industries. The corporation has also acquired the patent rights for the United Kingdom for the manufacture of pure zinc sulphide by a new and greatly improved process. Another interesting activity of the corporation is the formation of its subsidiary company, Cuprinol, Ltd. This company has been formed for the manufacture and marketing of Cuprinol wood and fabric preservative.

Johnson and Sons, Mfg. Chemists, Ltd.

Stand No. A.75

A COMPLETE range of photographic chemicals and developers, including Amidol, acid pyrogallic, Metol, hydroquinone, glycin, chlorquinol, Azol, and paramidophenol, is shown on this stand. These chemicals in pre-war days were only obtainable from the Continent and it is therefore satisfactory to note that they are being made in sufficient quantities by this firm to meet demands from all parts of the world. They are packed in bottles ranging from 1 oz. to 2 lb., or 50 grams to 1 or 2 kg., and are also supplied already compounded with the other chemicals, in powder or solution, to make a developer ready for use as required by the trade or profession. For instance, Metol is combined with hydroquinone to make a developer for X-ray films and plates, or for photo-copying machines where the printing and developing is done automatically and there are numerous other formulæ prepared for various processes and work.

Apart from the production of fine chemicals, Johnson and Sons are also manufacturers of pharmaceutical chemicals and preparations and in this group they have introduced recently Estersil, a fine chemical for the treatment of rheumatism, lumbago, sciatica and its allied complaints. Arvitin, an organic compound of colloidal silver, is a British-made preparation of silver combined with vitellinic acid from egg yolk, standardised to contain 20 per cent. of metallic silver in a completely colloidal form and it is used very considerably in ophthalmic work.

Kestner Evaporator and Engineering Co., Ltd.

Stand No. A.22

VARIOUS items of plant constructed in Keebush, a recently-developed non-metallic material which has the advantage of great mechanical strength as well as resistance to corrosion, is being shown by the Kestner Evaporator and Engineering Co., Ltd. This material stands up to hydrochloric acid at all strengths and temperatures up to boiling point. The exhibit includes a patent glandless acid pump, with Keebush contact,

working in conjunction with Keebush tanks; a portable stirrer is arranged on one of the tanks, the shaft and propellers being in Keebush. A Keebush autoclave arranged with electric heating illustrates its use for boiling acid, etc. Various Keebush fittings, such as pipes, valves, cocks, bolts and nuts, together with spades, buckets and oven trays illustrate the wide range of chemical plant and appliances that are being made in Keebush. A pump of a new patent type is also shown. This pump is of the positive rotary type and has several distinctive advantages. For example, there is only one moving part, there are no branches in contact with the acid and it is capable of starting up under a high suction lift without priming. Except for a special rubber sleeve, the pump is built in Keebush. A further item of interest is a Keebush high-speed fan.

An electrically-operated "Oldbury" patent carboy discharger is also shown on this stand, this being the latest and safest way of emptying carboys and also discharging the contents to a height.

B. Laporte, Ltd.

Stands Nos. A.74 and A.81

THIS firm is exhibiting samples of perborate of soda, hydrogen peroxide, sodium sulphide and the barium range, also pyrophosphate of soda. As an adjunct there is a display of samples of materials bleached with hydrogen peroxide.

At this stand the Malehurst Barytes Co., Ltd., is showing samples of unground and ground (bleached and unbleached) barytes.

National Titanium Pigments, Ltd., another associate of B. Laporte, Ltd., exhibits the raw material, ilmenite, and samples of the intermediate products showing the process of manufacture up to the finished product. The use of titanium pigments in the paint trade is demonstrated by various panels showing paints made with titanium pigments. An exhibit of rubber goods, and a selection of plastic moulded articles in which titanium pigments have been used, is also on view. Of particular interest are the samples of "F" grade National titanium pigment, which was made for the first time in England in May, 1933. This pigment contains approximately 82 per cent. titanium oxide and 18 per cent. barium sulphate, the two being co-precipitated in such a way as to give a pigment of unique properties.

South Metropolitan Gas Co.

Stand No. A.77

COAL tar and ammonia products resulting from the purification of coal gas and the distillation of coal gas tar will be shown by the South Metropolitan Gas Co. "Metro" road tar is a product to which a considerable amount of research has been devoted by the manufacturers for some years. The crystalline dry neutral sulphate of ammonia increasingly interests buyers who are conversant with artificial manures of all kinds. "Metro" sulphate of ammonia can be stored for long periods without changing its excellent condition or affecting the sacks in which it is held. Its content of as much as 25.71 per cent. ammonia—equal to 21.14 per cent. nitrogen—is a further recommendation when concentrated fertilisation is taken into account. "Metro" disinfectant fluid for general purposes, black varnish for protective treatment of outdoor ironwork, creosote for preserving outdoor woodwork—either by direct application in the cold state or by impregnation under heat and pressure, solid smokeless fuels, motor benzol. anthracene, sharp oil, pyridine, sulphuric acid, sulphate of iron, coal tar pitch, etc., have advantageous characteristics seldom obtained in similar manufactures.

Thomas Tyrer and Co., Ltd.

Stand No. A.80

THIS firm is exhibiting a number of technical chemicals which find application in the oil, paint, rubber, photographic, cosmetic and ceramic industries. One case is devoted to bismuth salts, including the carbonate, sub-nitrate, salicylate, etc. Particular attention is drawn to the carbonate which is shown in all densities from "extra light" to "heavy"; also to bismuth sodium tartrate in scale form, the composition of which is so regulated that the best results are obtainable when dispensing.

As manufacturers of products in scale form, Thomas Tyrer and Co., Ltd., have an outstanding reputation for the excellent appearance and purity of these particular compounds; samples of their iron ammonium citrate B.P. 1932, and iron quinine citrate B.P. 1932, are shown on the stand, together with hypophosphites. The fine dry granular form of their citrates of sodium and potassium B.P. 1932 is demonstrated by the samples exhibited.

Thomas Tyrer and Co., Ltd., are among the well-known manufacturers of "driers," and samples of these products are exhibited, including acetates, naphthenates and linoleates of cobalt, manganese, lead, etc.; these samples are of particular interest to the oil, paint and allied industries. A material of increasing use and importance in the oil and paint industries is aluminium stearate, which finds application in lubricants, greases, candles, polishes, paints, printing inks, cement, etc. Among the particular products exhibited for the rubber trade are cadmium and zinc sulphides and zinc stearate. Zinc, magnesium and calcium sterates are specially manufactured for cosmetic and allied purposes. Reference must also be made to photographic chemicals, particularly sodium sulphide (pure white crystal), iron ammonium oxalate and iron ammonium citrate (green scales).

Spencer Chapman and Messel, Ltd.

Stand No. A.45

THIS well-known firm is showing the acids for which it is famous, including oleum, 20 per cent., 40 per cent., 60 per cent. and 80 per cent.; concentrated sulphuric acid; battery acid; hydrochloric acid; nitric acid (chemically pure); sulphuric acid (chemically pure); and sulphur trioxide.

Whiffen and Sons, Ltd.

Stand No. A.79

IODIDES and bromides hold the most prominent position in the display at this stand. Iodides are of more than usual interest this year owing to the extraordinary low prices at which they are being sold. In January, 1932, the minimum price for potassium iodide was 23s. 2d. per lb. which figure was a serious handicap to business, but since that time it has dropped continuously to its present level of 5s. per lb. The fall has been brought about by the action of the Nitrate Corporation of Chile, who have gradually reduced the price of crude iodine in order to maintain their trade against aggressive non-British competition.

Many other fine chemicals and alkaloids are on exhibition, such as strychnine, emetine (in hypodermic tablet form for use in amœbic dysentery), salicin (product of the willow so effective in influenza and rheumatism), caffeine (the stimulating principle which is found in tea and coffee), atropine, quinine, nicotine, camphor, essential oils, extracts, and vermilion.

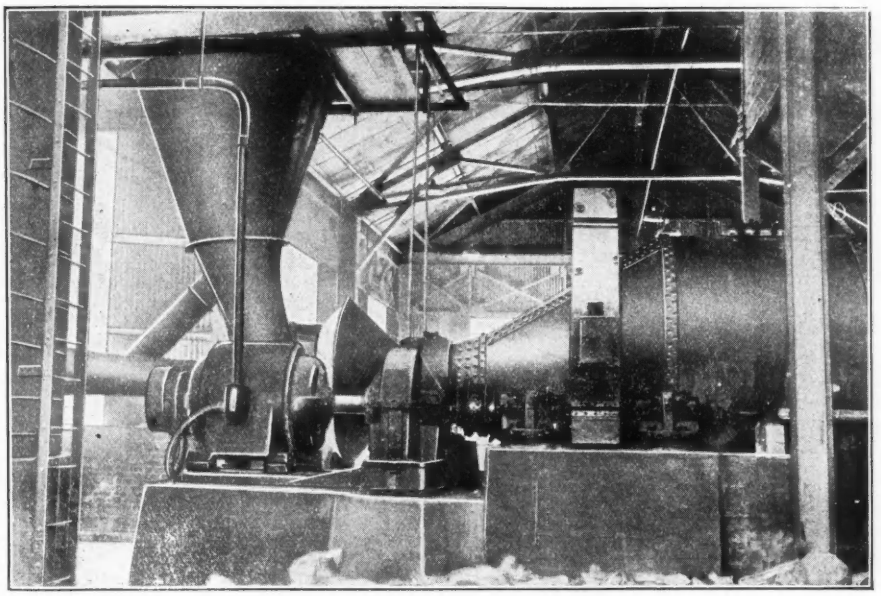
There are two interesting proprietaries in the form of Plianol, a preparation for leather dressing, and Gelozone, which is arousing great interest as a stabiliser for ice cream and also as a remarkably effective agent for the prevention of shrinkage in potted meats, etc.

Williams (Hounslow), Ltd.

Stand No. A.76

IN addition to dyes for the plastic industry, Williams (Hounslow), Ltd., are showing dyes and stains for wood, leather, casein, celluloid, etc. There is a range of dyestuffs soluble in methylated spirit, water, oil or nitro-cellulose solutions, and dyestuffs soluble in waxes and fats, suitable for boot polishes, candles, etc. There is also a range of special colours for toilet and household soaps. This firm makes a speciality of colours for industries deaing with toilet requisites, cosmetics, etc. Acid dyes for wool, silk, feathers, etc., form an important part in the display, while the firm's dyes for all kinds of inks are well known in the trade. There is also a range of Linsol colours soluble in naphtha, amyl acetate, white spirit, etc.

Williams (Hounslow), Ltd., possess a laboratory and staff devoted to the work of matching individual shades for customers' particular requirements and this expert advice is at the disposal of all inquirers. The firm has specialised in the manufacture of guaranteed harmless food colours and possess an unrivalled knowledge of the regulations in force throughout the world.



Hardinge Grinding Mill with Air Separation.

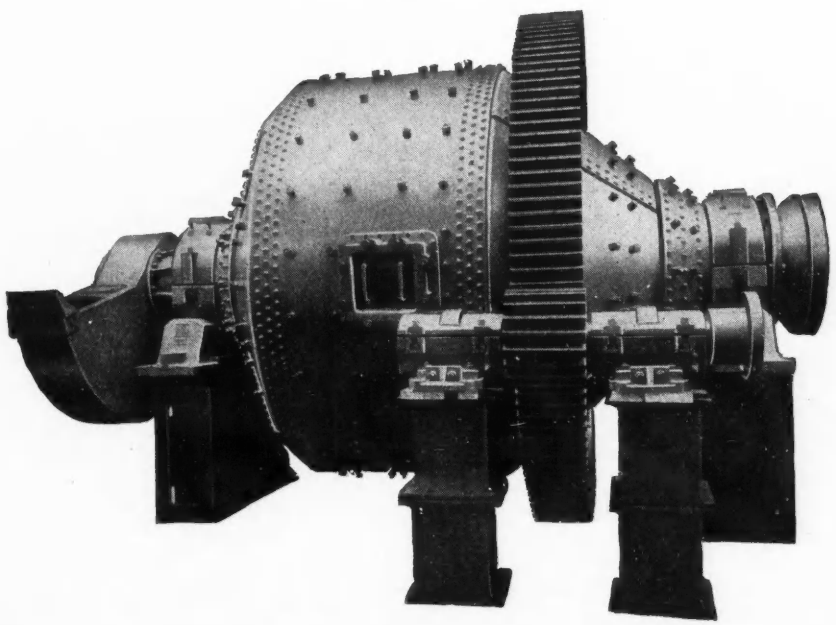
The Maintenance of Grinding Mills

By W. A. Stapleton
(International Combustion, Ltd.)

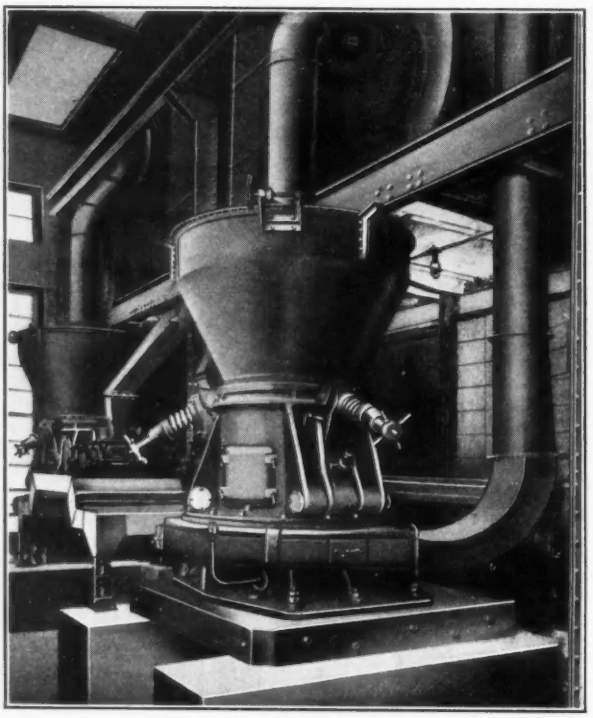
THE manufacturer of the present day continually runs into pulverisation problems which his predecessor did not encounter. It was possible for the predecessors to command a high price for a given article, whereas to-day everything is brought down to the lowest possible figure owing to severe competition universally. Therefore, each manufacturer must closely study his cost per ton for each material handled, whilst it is very important to note plant maintenance and repairs of each individual unit.

Grinding mills should first of all be specially selected to suit the actual material to be treated. In many cases grinding plant is favoured from the initial expenditure without any investigation as to how much replacements will cost per ton of material ground. It is also very important to note that the proper choice of modern grinding equipment allows the pulverising department to be kept as clean and dustless as any other part of the plant. Dustless operation is economical operation; maintaining a clear atmosphere in the grinding room not only will eliminate much wear and tear from auxiliary equipment, such as belts, bearings and motors, but at the same time will decrease accidents and in general be conducive to the health of the operating force.

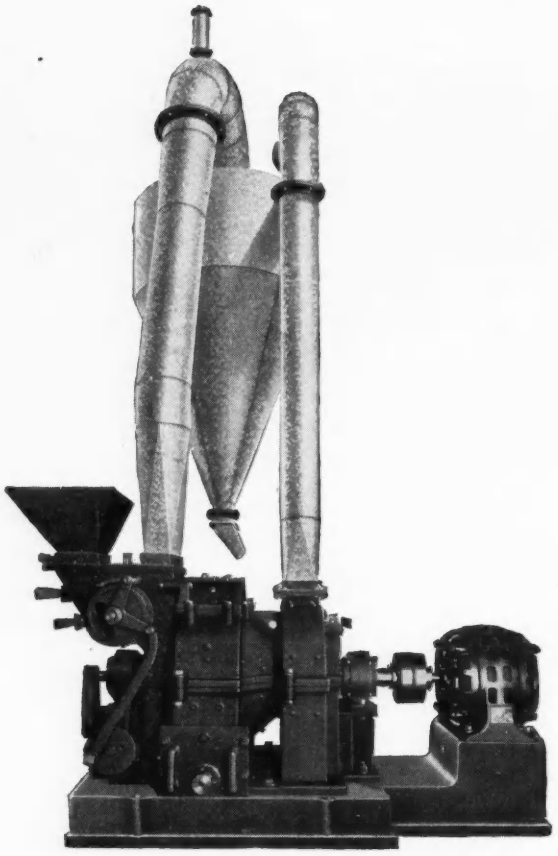
Wear and tear on grinding plant can be governed quite definitely by operation; for instance, supposing we have chosen the correct machine for the material handled it is equally important to watch that conditions of feed remain a constant. It is easy to visualise, in many types of medium-



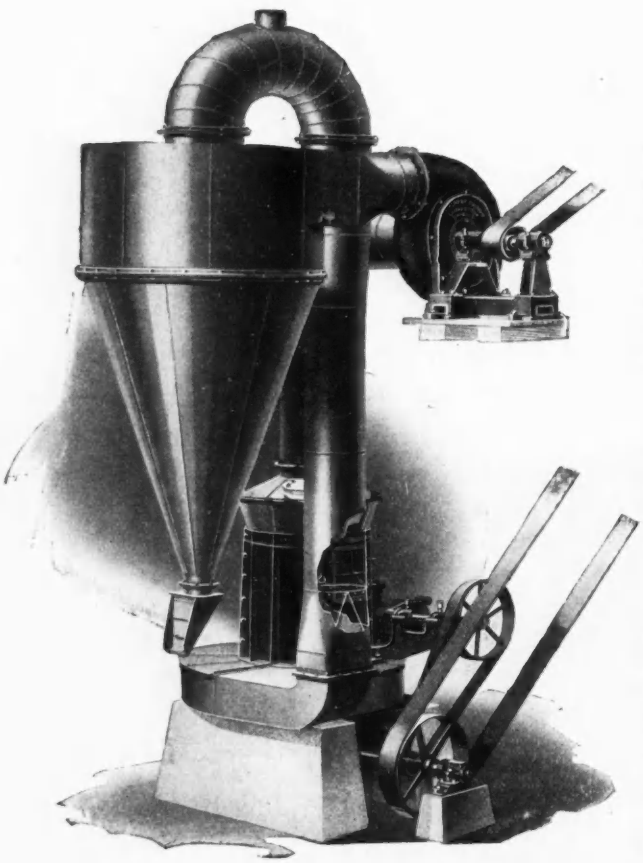
The photograph on the left shows a Hardinge Mill without Air Plant.



Raymond Lopulco Mill with Air Separation.



Raymond Impax Mill with Air Separation.



Raymond Mill equipped with Air Separation.

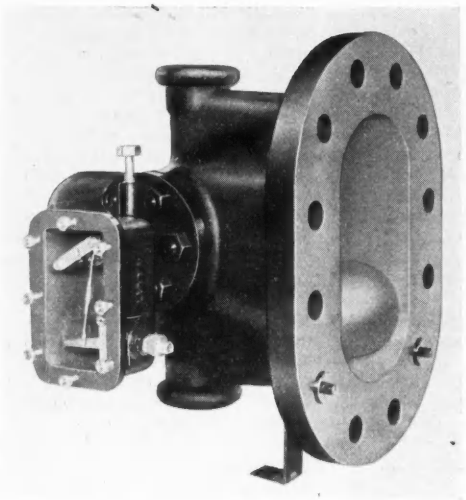
speed mills, such as ring and roll, that if the mill is allowed to run practically empty the rolls running on the grinding ring will set up unnecessary wear. In the case of ball mills, which are a comparatively slow-speed type, the same thing applies, and an empty mill will allow the balls to grind themselves away because there is nothing to cushion against. This does not apply to the general type of high-speed pulveriser as far as running the machine empty, but, on the other hand, it is well known that high-speed beater, pin, or hammer mills wear out much quicker on a number of materials solely due to the method of grinding, especially on a fairly hard or semi-abrasive material.

The various types of mills can be classified as follows:—

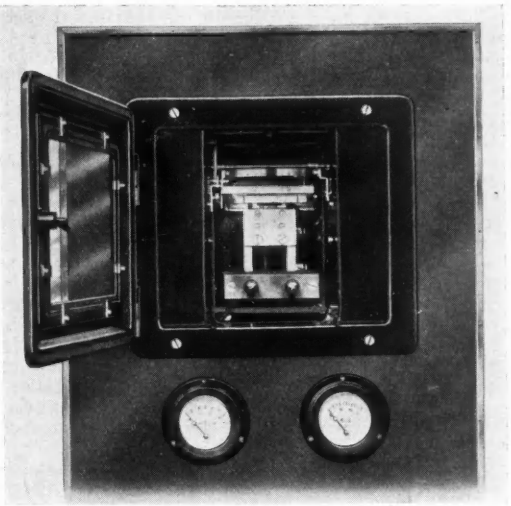
Material.	Type of Mill.	Speed.
1. Hard and abrasive.	Ball mills.	Slow speed.
2. Semi-abrasive and medium hardness	Ring roll.	Medium speed.
3. Soft grades of chemicals, etc.	High speed. (Beater, pin or swing hammer.)	High speed.

From this classification we can readily see that for continuity of operation on siliceous materials the lowest maintenance costs are obtained on the ball mill. Abrasives can be treated on this type of mill and the grinding media can be introduced whilst the mill is running. This is a very important factor, because when grinding media are replaced many types of mills have to be stopped; this means loss of production time and the addition of labour charges must be taken into account for making the replacement.

This brings us to the question of accessibility of parts requiring replacement. There are mills on the market which have been specially designed to allow for ease of replacement, and the accompanying illustrations will indicate special features.



Pneumatic Level Regulator, showing the float, and the external pilot valve. (Geo. Kent, Ltd.)



Pneumatic Controller for difference in temperature, with a potentiometer attachment giving a large range of temperature setting on the dial. Temperature is measured by thermo-couples. (Geo. Kent, Ltd.)

Maintenance by Automatic Control

Pressure, Temperature and Flow Controllers

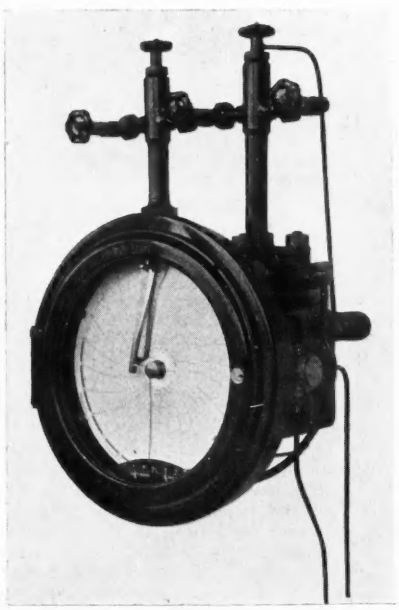
IT is almost a truism to say that an increase in efficiency results in a decrease in maintenance costs, yet it is undoubtedly the rule. Equally, the purpose of plant maintenance is to preserve efficiency, and it is the object of this article to show how control instruments help both efficiency and maintenance.

Modern processes are precise in theory and it is no longer possible for them to be carried out by smell, taste and feel under the eye of experience. Rather it is becoming usual to measure all the variables and adjust them to the chosen values. If this adjustment has to be continually effected by hand it is inefficient, for the operator can be better employed than carrying out a purely mechanical task, and automatic controllers do not suffer from distractions or fatigue. The operator should be accustomed to see that the controllers are adjusted to the optimum values and that the process generally is being carried out to the best advantage. He will then be able to check any fault before it becomes serious and thus directly reduce wear and tear on the plant.

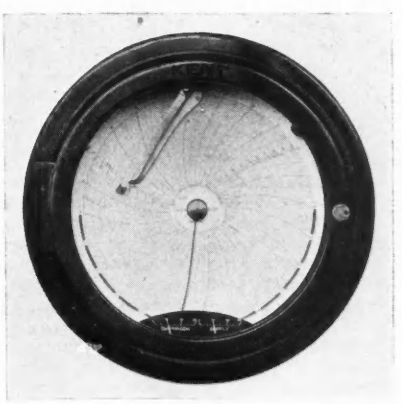
The controllers themselves help in this. By keeping conditions steady at the best values the output is increased and the quality is higher. The plant is also spared strain and stresses caused by fluctuations of pressure or temperature and is enabled to run for longer periods between overhauls. An example of this is given by the results obtained in a small power station where one boiler of the bank was fitted with automatic control of the fuel. At the end of one year of continuous operation the boiler was found to need no refractory repairs and the stoker was as new. The other boilers had to be rebricked every three months and the stokers had many renewals also. In this case the automatic control, by keeping the firing conditions steady and correct, showed a direct saving of more than its cost in its first year of operation.

The uses to which controllers are put may be classed as either primary or secondary. In the primary group are placed the pressure regulators and flow controllers which are used to keep a steady input to a process, while the secondary group will usually include temperature controllers and others which take effect in the intermediate or output stages.

In many types of process by using an adequate number of primary controllers the whole plant can be kept steady with little or no need of secondary regulation, and as the primary class may often be of the simple direct-acting type this is a great advantage. Naturally, where several processes are working off the same supplies, primary control is even more essential to prevent fluctuations in any one from affecting all the others. Controllers themselves have varying effects on a plant, according to their operating principle. In the case of flow, pressure and level control there are roughly two basic principles, one being the "proportional" or "positioning" type in which the controls are moved to a position



Modern Flow Controller, showing the pilot valve, on the side, to which the connecting pipes are directly attached. (Geo. Kent, Ltd.)



Pressure Controller, showing the neat built-in pressure gauges which save time and trouble in installation. (Geo. Kent, Ltd.)

depending on the deviation of the variable from the correct value. The second type has still the proportional control, but with a secondary correction. To this type belong the Kent Autocrat, the Stabilog and similar controllers. These two types satisfy different requirements. Where the operating conditions are easy and accuracy need not be too great the ordinary proportional system should be used, while the second type will give satisfactory results where a proportional controller would be useless.

Temperature controllers are made in many more varieties. There is the primitive type of controller that switches power on when the temperature is low, and off when it is high, and which cannot ever cease to swing up and down as long as they are in use. For robust and simple applications, like furnaces, this type can be very satisfactory as the temperature of the general mass of the furnace will hardly change. Modern examples of this type operate on a slightly different principle, and give only one quarter of the amplitude of the oscillation, which widens their possible applications. Temperature controllers are also made in "proportional" and "corrected proportional" types like the other controllers, and there are advanced electrical types working on other principles which can maintain a temperature in a large continuous process to less than 1° F. at 1,100° F.

With the exception of the "on-and-off" controllers, a continuous oscillation of the controlled quantity is an indication of a controller either out of adjustment or in an unsuitable location, and such "hunting" of the controls should not be tolerated. It is very detrimental to the quality of the product and invariably causes undue wear and tear in the plant. With a complicated process a single controller "hunting" will have its effects on every other part of the plant, and may cause other controllers to give trouble. With simple controllers the cure is invariably to decrease the sensitivity either by readjusting the controller or by fitting a smaller control valve.

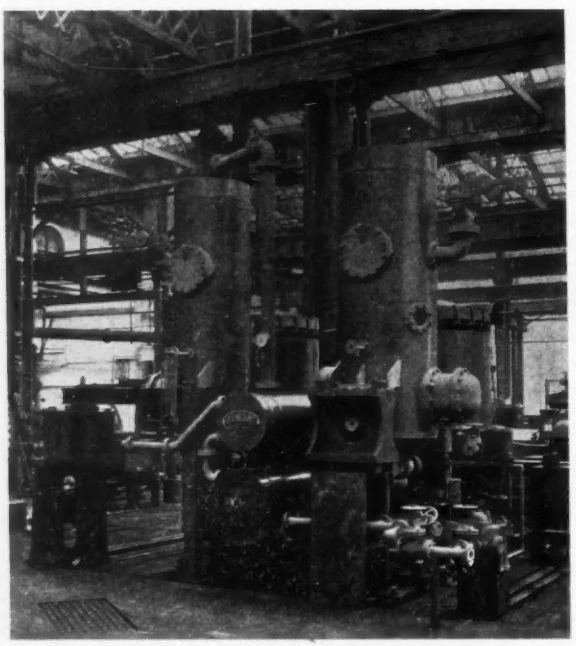
In the more advanced type of controller "hunting" is cured in various ways, and adjustments should preferably be done by someone who has been trained in the servicing of instruments. This training can be obtained at the works of the instrument makers, who are always glad to ensure that their instruments will be kept in the best possible condition.

Distilled Water for Chemical Works

An Evaporator for Production in Bulk

In many chemical operations, as well as in the food industries and for dyeing, it is often an advantage to use pure distilled water; also, for power stations and in large chemical works the best method of operating the boiler plant is to use only pure condensed water for the make-up, in order to eliminate all the troubles caused by softened water, including films of scale deposit and soluble salts.

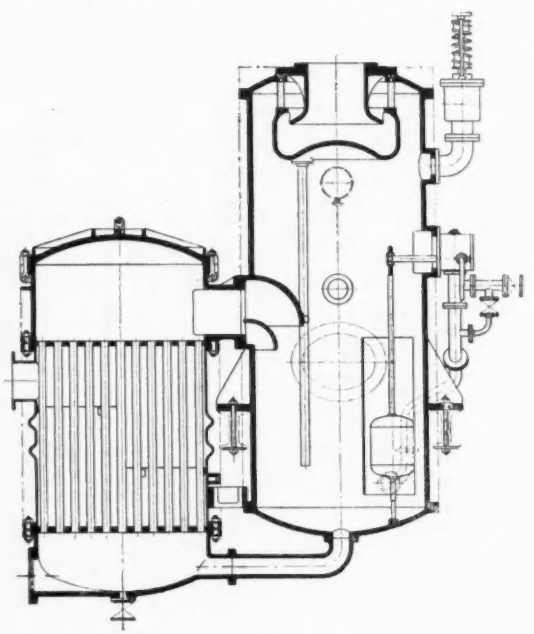
The latest designs of feed-water evaporators made by Hick Hargreaves and Co., Ltd., are suitable for the bulk production



Typical Hick Hargreaves Evaporator assembled in the shops at Bolton.

of pure condensed water, in addition to providing distilled water in the form of a water vapour (steam) passed direct into the boiler feed circuit. The plant consists of one or more calandrias or tubular heat-exchanger units connected to a main cast iron evaporator body, which is equipped with automatic float control gear, water separator, steam dryer, and the necessary valves, safety valve, cleaning valves and other accessories. The calandria, connected at the top and bottom to the evaporator body, consists of a vertical closed steel cylinder containing a large number of straight, vertical, wide-bore heating tubes expanded into tube plates at the top and bottom.

The steam, for heating, enters at the top of the tube space,



Vertical Section of "Hick Hargreaves" evaporator, with one calendria (on the left) and evaporator body (on the right) with safety valve, balanced piston valve controlled by a float and lever, steam separators and drier and hand-operated by-pass valve.

passes round the outside of the tubes, guided by a series of baffles to ensure the maximum travel, and is discharged from the bottom as condensed water which is returned to the boiler feed circuit. The raw water passes into the evaporator body through an inlet branch pipe, controlled by a balanced type of piston valve with a float and lever, and travels from the bottom of the body up through the inside of the calandria tubes, the level in both vessels being maintained automatically by the float valve of large and robust construction, which opens or closes according to the amount of evaporation.

There is also a hand-by-pass valve, to supplement the float valve if necessary.

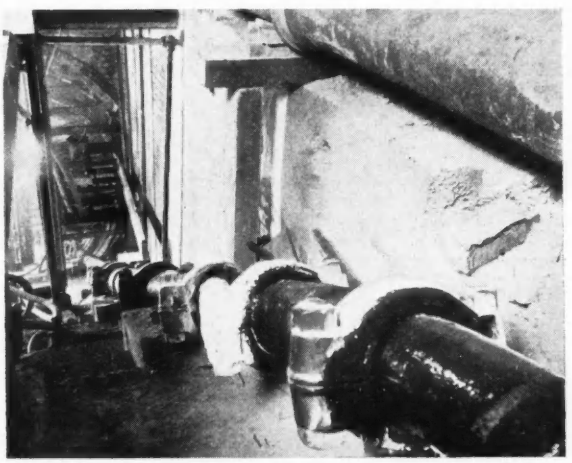
The vapour or steam in the calandria, scrubbed from water particles, passes out at the top into the evaporator body through a primary steam separator arranged with baffles to form two sections. In the lower section water is passed through continuously, because there is a natural circulation between the evaporator body and the calandria, since the heat transfer is in the latter only. The upper section of the baffle dries the steam, which then passes up through the evaporator body and discharges by way of a separate final steam dryer in the top cover to the feed-water circuit, or to a condenser if separate production of distilled water is required.

Two or more calandrias can be connected to the same evaporator body, this being often the most convenient practice since one unit can be heated by low-grade exhaust steam and the other by supplementary high-pressure steam. The whole design is neat and efficient, the straight heating tubes of large diameter allowing of easy cleaning and inspection. The diameter of these tubes in proportion to the length has been carefully proportioned to produce the maximum ebullition, resulting in high water velocity, high efficiency of heat transmission and automatic cleaning of the tube surface.

Flexible Pipe Joints

Flexibility Combined with Efficiency

THE rigid type of pipe joint has the serious disadvantage of lack of flexibility, and therefore a tendency to fracture and leakage. This is a particularly important point to consider in connection with the maintenance costs and general efficiency of chemical works. The "Victaulic" flexible joint, a production of The Victaulia Co., Ltd., is suitable for pipes made of steel, wrought iron, cast iron and stoneware. The value of this joint is well illustrated by extensive orders that has been received from Imperial Chemical Industries, Ltd., during the last 18 months in connection with the new hydro-



Steel Hydraulic Main, 6 in. diameter, fitted with "Victaulic" joints, in Leicester Square subway, London, illustrating the great flexibility of the pipe line.

genation plant at Billingham, where many hundred joints of 21 in. to 36 in. bore, for both steel and cast iron pipes, are in evidence.

The general principle of the Victaulic joint consists in the use of a heavy ring of high-grade resistant composition bent over in the form of a flat inverted "U," contained in an outer steel or non-corrosive alloy casing, the pipes being made with a small shoulder or rim at each end. As a result there is formed a connection which in the first place is absolutely tight within a very wide range of almost vacuum up to 4,000 lb. per sq. in. pressure. Different rings are provided according to the circumstances, and these joints are operating on mains in connection with benzol, petrol, kerosene, ammonia, and sulphuric acid; they are also valuable for compressed air, so largely used in the chemical and allied industries, and in this connection give a dead-tight joint.

The Victaulic joint allows of a remarkable degree of flexibility in a pipe line, which, when of great length, almost resembles a cable. For example, many thousands of these joints are fitted on pipe lines for oil, high-pressure natural gas, and water (both salt and fresh), which are merely laid on the ground over all kinds of wild country, including mountains, rivers and marshes.

Spray Painting

Use of Portable Equipment

A PORTABLE spray painting plant of considerable usefulness has been designed as a modification of the popular Wells' "Paintrow" plant, and is a convenient one gun portable equipment for all types of painting. It is especially suitable for works maintenance painting, engineers' requirements, contractors' and decorators' work. The power unit consists of an efficient water-cooled petrol engine, two-stroke type, with fly-wheel magneto ignition, petroil lubrication (quarter-pint oil to one gallon petrol), hopper cooling tank and fuel tank mounted above the engine. The air-cooled air compressor, which is direct-coupled to the engine, is of sufficient capacity to operate the standard No. 3 or 4 spray gun with cup or pressure container feed, and delivers air to a 1½ cu. ft. capacity welded steel air receiver, fitted with pressure gauge, spring-loaded safety valve and drain cock. The air supply then passes through a Wells' single type air filter fitted with air reducing and control valve, pressure gauge, drain cock and removable filtering medium. The units are mounted on a substantial four-wheeled truck fitted with two swivel wheels and handle for transport, and the plant is complete with 20 ft. length air hose, unions and No. 4 type improved spray gun with half-pint paint cup and deflector nozzle. As an alternative, the engine can be replaced by an electric motor. Where one type or colour of paint is being continuously sprayed, a pressure container should be used an an alternative to the paint cup attached to the gun. There is a range of capacities from 1 gallon upwards; net weight, 3 cwt. 22 lbs., overall measurements, height 27 in., width 23 in., length 45 in.

The Material of Infinite Uses

Bakelite Sound Film

"BAKELITE, the Material of Infinite Uses," was the title of a sound film shown by Bakelite, Ltd., at a private theatre in London on Tuesday. The film illustrates the manufacturing processes involved in the production of bakelite and shows some of its applications. No less remarkable than the variety of applications of the material are the manufacturing processes illustrated. The initial stage in the production of a moulding such as a radio cabinet is the chemical combination of phenol and formaldehyde, to form a synthetic resin or resinoid. This resinoid is similar in appearance to a natural resin, but is essentially different in its physical characteristics. The film shows the resinoid ground to a fine powder and incorporated with wood meal and a colouring medium. This mixture is compounded between hot rolls—cooled—ground—and blended to produce granular moulding material.

At the moulding works an operator is seen feeding a measured quantity of moulding powder into a highly-polished steel mould, and after a few minutes, removing a moulding which is an exact counterpart of the mould in shape and finish. Screw threads are incorporated in some mouldings, as are also metal inserts. The sphere of plastic materials is not confined to mouldings, and a sheet—or laminated material—produced by the combination of bakelite resinoid and paper or fabric is equally serviceable for electrical insulation, for the manufacture of silent gears and pinions, and for veneering furniture, wall panelling, etc.

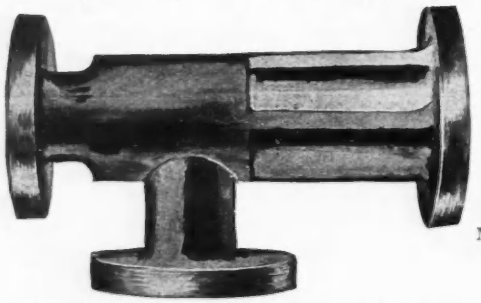
Paints, varnishes, cements and lacquers too have a bakelite resinoid base. To instance but a few of their uses the film shows how metal ornaments are sprayed with lacquer to enable them to retain their pristine polish; electric lamp bulbs are secured to their brass caps by a bakelite cement, and a similar material secures the bristles of a shaving brush into its handle. A display of bakelite articles gives some indication of the extent to which bakelite is employed in the electrical, building, automobile and many other industries.

Lifting Acid Liquors

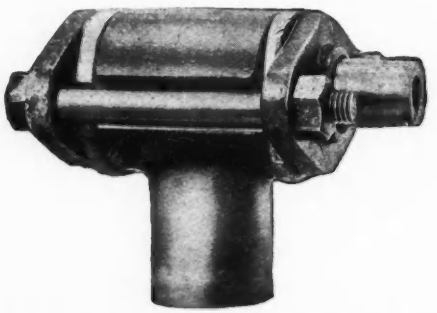
The Advantage of the Elevator

AMONG the problems with which the chemical works manager is from time to time confronted, is that of lifting and elevating sulphuric acid in an economical way in connection with works processes.

A variety of acid-resisting regulus metal elevators are made by the Haughton's Metallic Co. These are adapted for lifting sulphuric acid by means of high- or low-pressure steam, and they form a very suitable accessory for use in this direction, where the cost of a special pump may often be prohibitive. There are numerous instances where acid liquors, such as waste acid liquor from nitration processes, waste acid from pickling tanks, and various effluents containing acid, have to be pumped or discharged into tanks in considerable quantities, and it is for this class of use that Haughton's regulus metal elevators are specially suited. They are further extensively applied for dealing with mother liquor from sulphate of ammonia and sulphate of copper manufacture. All parts of the elevators are made of acid-resisting material—some are made throughout of "Ironac" acid-resisting iron, for cases where the ordinary regulus metal is found to be unsuitable. These lifting ejectors are very economical where used with steam, and for filling and emptying tanks, nothing simpler can be devised. Most of the elevators are provided with renewable steam and delivery nozzles in such a way that the only wearing part can always be replaced at the cost of a few shillings, and there being no moving parts there is little wear and tear.



Acid Resisting Regulus Metal Acid Elevator.



Sulphuric Acid Elevator, "Strong Arm" Pattern.

Exhausters and blowers for acid fumes are also made by Haughton's Metallic Co., for dealing with acid fumes and waste acid gases from various processes. These are made in regulus metal for sulphurous gases and in Ironac metal for either sulphuric or nitric acid fumes, and they perform with advantage and economy the work for which otherwise very expensive acid fans would have to be put into commission.

Both acid elevators and exhausters and blowers for acid gases give very valuable economy in chemical works where corrosive liquors are continually being dealt with.

Blending Hard and Soft Water

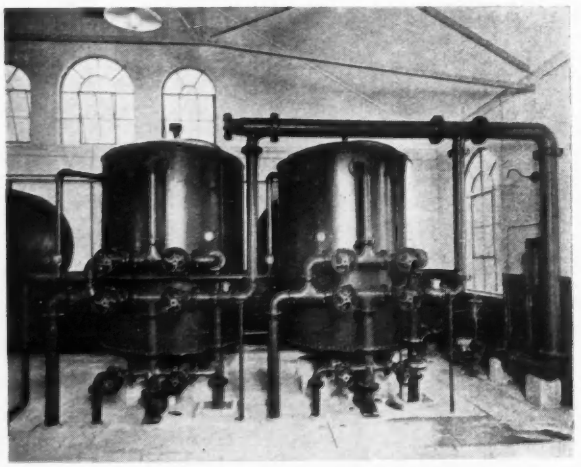
Value of Base Exchange Methods

THE value of softened water and the elimination of scale in boilers, evaporators, pipes and other equipment in regard to chemical works maintenance does not require emphasis. In this connection, base exchange softening is of great value, especially as regards efficiency and convenience of operation, the water merely running through a granular product contained in closed cylinders and emerging with zero hardness. If the raw water contains much temporary hardness, however, the softened water is alkaline because an amount of sodium bicarbonate is formed, corresponding to the calcium bicarbonate, by reaction with the base exchange material.

For many applications this alkalinity is a disadvantage, but the problem is easily solved by by-passing part of the hard water so that the final mixed or blended water as supplied contains any desired degree of hardness, an interesting point for many chemical operations as well as feed water when water-tube boilers are used. Base exchange softening lends itself to such methods, and the latest scientific principles in this connection are well illustrated by an installation for town's water supply at Harpsden for the Henley-on-Thames Water Co., who have sunk at Shiplake (near London) an artesian bore 12 in. diameter to a depth of 200 feet as an auxiliary source of supply.

This base exchange plant was supplied by the Paterson Engineering Co., Ltd., and the installation consists of two vertical closed cylinders 5 ft. 6 in. diameter, filled with the firm's "Basex" softening material, a high-grade synthetic aluminium silicate in the granular form along with salt solution tanks for reviving. The water from the borehole is 21° total hardness, and softened water of 7° total hardness is required by the consumers. Accordingly, the main supply zero hardness water from the two softeners is mixed continuously in the pipe circuits, by means of suitable automatic valve gear, with a portion of by-passed hard water, so that the final water is always 7°, each of the softeners also being fitted with a water meter.

The duty of the softening plant is 24 hours' continuous pumping by one pump, or 12 hours by two pumps, and the total capacity of the plant, as already indicated, is 10,000 gallons of softened water per hour; also 90,000 gallons of water are treated between regenerations.



"Basex" Water Softening Plant at Shiplake with a capacity of 360,000 gallons per day.

Selection of Crushing and Grinding Machinery

By F. W. WISEMAN (Christy and Norris, Ltd.)

UNTIL comparatively recent years, problems in connection with the size reduction of either raw materials or finished products were, in far too many instances, tackled without any regard to the physical properties of the material to be reduced. The grinding efficiency of the plant was seldom considered, the predominating idea being to find a machine which would do something towards reduction.

The economic pressure of competitive industry has caused the whole question of grinding and crushing to become one of major importance in those industries where a large proportion of their total power requirements emanate from the grinding rooms, and with a view to rendering the best possible assistance to industry, all reputable manufacturers of grinding plant have spent considerable sums of money in determining the relative efficiencies of their machines on representative commodities. To illustrate the importance of grinding efficiency it may be assumed that two machines A and B are tested to produce a given desired sample, and the efficiency graphs are given. If the material is such and facilities are available to keep the load constant at approximately 25 h.p., the machine B should be used; on the other hand, if the load is very variable and is often over 30 h.p. or under 20 h.p., machine A might prove the more economical. Having determined the power consumption efficiency for a given material it then becomes a question as to which machine produces the required sample at the most efficient loading. If machine A produces the best sample at 30 b.h.p. and it can be maintained at this load whilst machine B can only produce the sample at 35 b.h.p., then A is the more economical. Again if the cost of upkeep due to wear and tear in A is £20 per given tonnage, whilst B is only £10, then upkeep cost may allow a certain latitude as regards power consumption in favour of B.

Features Peculiar to Individual Machines.

The foregoing example is sufficient to give an idea of the main factors concerned in grinding efficiency; the features peculiar to individual machines are the accessibility of those parts likely to be frequently changed or renewed, service given by manufacturers, either in the case of spare parts delivery, or attention in difficulty, and the interchangeability of spare parts, it being possible to lose quite a lot of money whilst a machine is standing due to ill-fitting parts requiring attention. At the present time no executive can afford to assume all is well in his grinding plant, because it is seldom brought forcibly to his notice.

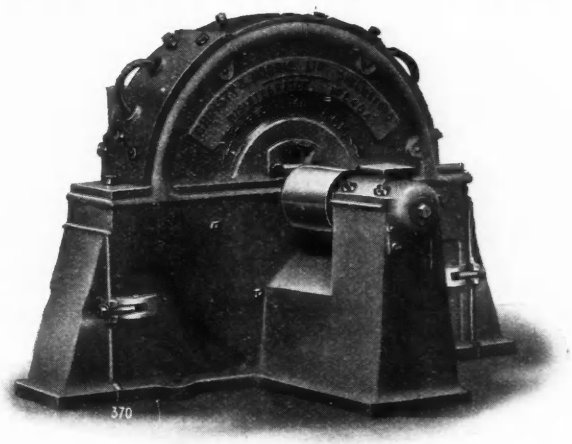
Bound up with the question of grinding is that of grading. In some cases the problem is one of extreme fineness, *i.e.*, anything left on a 200 per lineal inch sieve is not required, whilst in another case, anything passing a 200 mesh sieve is waste. Not infrequently a different use is found for the various size grades of a material which may call for varying quantities of each grade from time to time, when a grinding machine capable of producing a ground sample readily varied to suit fluctuating requirements is invaluable.

Most crushing and grinding machines may be broadly classified under one or other of the following four types:—I, Squeezing; II, rubbing; III, smashing; and IV, abrasive, or combinations of them. Machines which come under Class I are crushers of the toothed roll and moving jaw types, which are made from very large sizes down to small machines operated by hand, and are suitable for preliminary size reduction, the extent in the case of ores and minerals generally not exceeding a ratio of 4:1 per pair of rolls or a single jaw, by which is meant that a 20 in. cube would be reduced to about 4 to 5 inch cubes by one pair, and the 4 inch may be reduced to about 1 inch cube in a second pair of rolls. The success of rolls on a specific material depends largely on the shape and spacing of the teeth and the relative teeth speeds of the coupled rolls.

Materials which are friable or those with pronounced lines of weakness form the major output of these machines and the same may be said of the jaw crusher, which consists in principle of a vertical anvil, either as a flat surface or an inverted cone, against which a moving jaw is oscillated, the action of the jaw being such as to exert a downward combined squeezing and rubbing effect, an almost infinite variety of mechanical movements having been designed to produce the desired result.

Under Class II come the smooth rolls, such as are used for the paint trades, the homogenisers and colloid mills. The desired result in these machines is obtained by forcing the constituents between a pair of moving surfaces set to a carefully controlled predetermined gap. A machine which combines rubbing and squeezing is the edge runner, which consists of one or two heavy rollers rotating about a central pillar in a suitable pan, the material being fed into the pan and left until the squeezing and rubbing action between rollers and pan, due to the rollers having a constantly changing direction of travel, has produced the desired sample.

In Class III are the impact grinders, which form the most important range of general-purpose grinding machines. Under this heading come the beater type grinder (as illustrated), which consists in principle of a rotating hub generally at relatively high speed, armed with beaters, or flails, which rotate in a closed chamber of varying shapes, and containing an inlet for feeding in the material to be ground, and a screened outlet through which the material passes when ground fine enough to pass through the apertures. A second type consists of cages or pegs rotating in contra directions within one another, the material being fed in the centre and



A Typical Disintegrating Plant. (Christy and Norris, Ltd.)

by passing successively past the rotating cages or pegs, spaced at different centres to affect reduction ratios, is ground to the desired fineness.

Included in this class is the ball and tube mills, which are a combination of impact, squeezing and rubbing. They derive this name from the fact that balls of steel, iron, flint or any other desired material. Or in some cases long rods, are rotated in a drum of varying shapes into which the material to be ground is fed. Extremely fine grinding is possible with these machines, as the work can be arranged to carry on until the product is fine enough to be removed by elutriation. Another machine employing a combination of impact and squeezing is the drop stamp, a very simple type, which consists of a weight lifted vertically and dropped on an anvil over which the material to be crushed is fed. The machines are almost exclusively used for the reduction of ores with very high hardness numbers.

Class IV is peculiar to the grinding of wood pulp for the newsprint paper mills where the logs are fed under pressure against a grinding wheel of abrasive stone, the resulting pulp being carried off by the cooling water.

It is very difficult to generalise as to the probable power consumption for producing a given sample, the main criteria being the increase of exposed area, *i.e.*, the area of a one foot cube is 6 sq. ft., but if cut into 1 inch cubes the area becomes 39 sq. ft., and for 0.1 inch cubes becomes 363 sq. ft., and so forth. The power consumption for crystalline materials goes up roughly in proportion to this increase of exposed surface.

In the case of material such as timber this is not true, as the physical properties of the material tested across the fibre, or grain, is totally different to the results obtained when tested coaxially with the grain, and this material when ground in a beater type machine consumes relatively little power to produce a sample largely composed of needles, but absorbs proportionally much greater power to reduce the needles without the corresponding increase of exposed surface.

Screening and Sifting in Chemical Works

A Selection of Modern Plant

A WISE selection of plant best suited to the handling of particular products is one of the principal factors in controlling maintenance costs in the screening and grading department of the chemical works. The illustrations reproduced below show a few typical separating and grading plants manufactured by Wm. Gardner and Sons (Gloucester), Ltd.

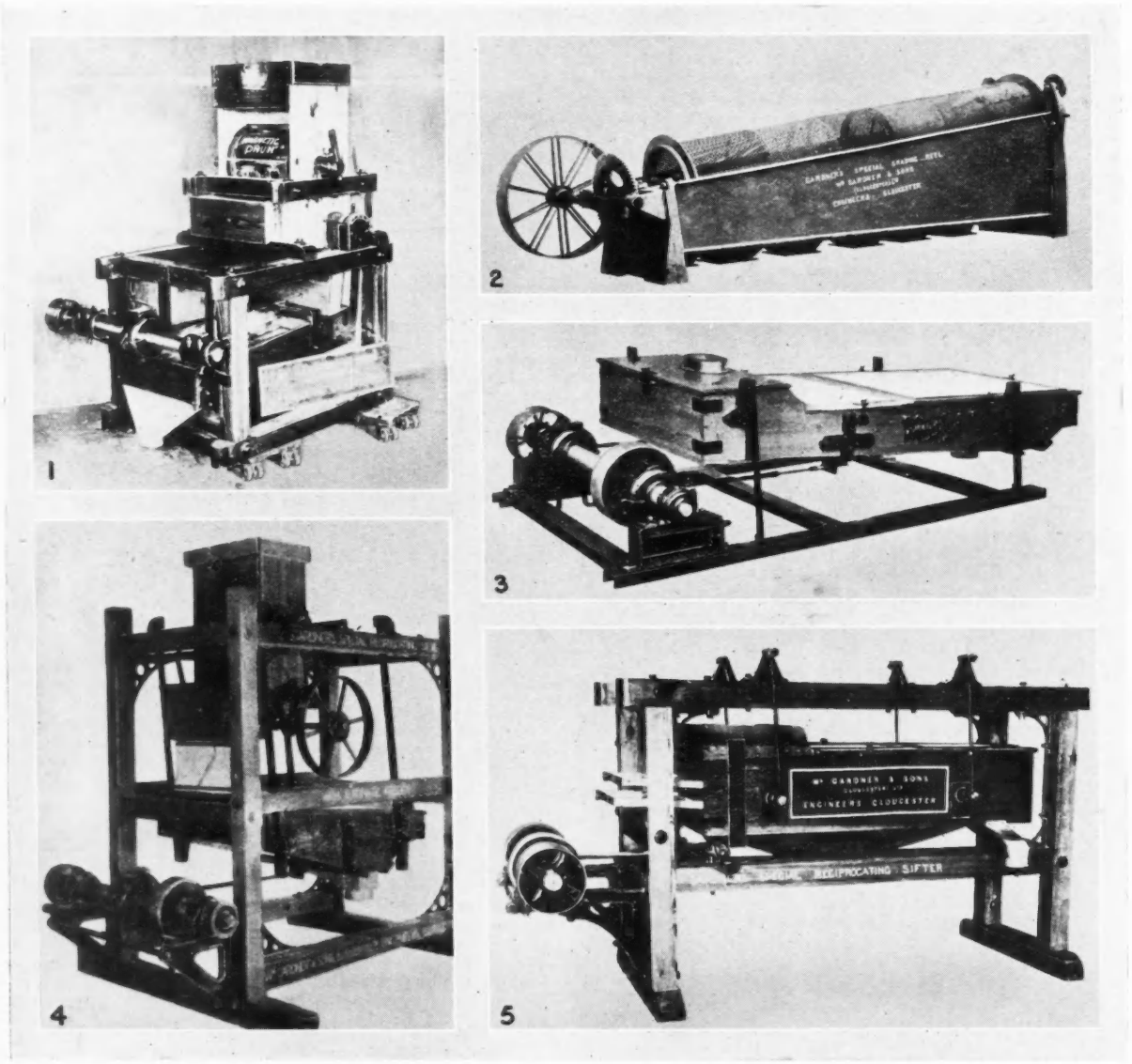


Fig. 1.—A Reciprocating Sieve Separator, with magnetic Drum fitted over for taking out foreign matter such as nails, filings, steel, etc.

Fig. 2.—A Reciprocating Sieve Separator fitted with an Automatic Feeder for regulating the supply to the Sieve.

Fig. 3.—An inclined Grading Reel, the barrel being covered with various meshes to give the grade required, and specially hoppered, for filling into the various sacks or receptacles.

Fig. 4.—Special Reciprocating Sieve fitted with Patent Ball Cleaning Device, the whole enclosed in frame to prevent the escape of dust.

Fig. 5.—A Reciprocating Sieve Separator.

Autoclaves for the Chemical Industry

Refinements in Design and Construction

An autoclave is an apparatus derived from Papin's digestor, for heating liquids at a temperature above their boiling point, and sometimes fitted with agitators working through stuffing boxes; such is Thorpe's definition. If we include the treatment of solids at a temperature and pressure above the chemist's N.T.P. a comprehensive definition is obtained and one which can replace a long list of trade and specialised names such as vulcanisers, reaction chambers and digestors. Retorts are not strictly autoclaves, *viz.*, a laboratory glass retort, but it has unfortunately been adopted by the canning trade in particular, and so must come under the heading. Impregnators as use in the cable industry, for example, come under this heading also, but the heat is applied to lower the viscosity of the impregnating liquid rather than to help chemical reaction. A classification of the subject under its practical applications would be irrational and interminable. It is preferable, therefore, to specify the known types of autoclave, which can hardly be expanded indefinitely.

An autoclave can either be vertical or horizontal, in a fixed position or mounted on trunnions to rotate; further, it can be agitated or non-agitated, and besides this the heat can be applied internally or externally. The factors governing the choice of any of these types are numerous and often peculiar to an individual industry. Briefly they are temperature and pressure required; source of heat available; degree of agitation required and consistency of substance; method of charging and discharging; space available; initial and working cost desirable, etc.

Fig. 1 shows horizontal steam-jacketed agitated autoclaves. The internal working pressure being 1,000 lb. per sq. in., the vessels had to be of a restricted diameter to avoid excessive plate thickness, the length required for capacity made agitation of the solid material being processed difficult, but with a vertical vessel a lifting type of agitation could be obtained. It was also desirable to obtain the maximum surface for gas penetration. High-pressure steam was available and made heating a simple matter.

Fig. 2 is a vertical steam-jacketed non-agitated autoclave. In this case the material to be treated could not be put into the autoclave in too great a bulk so that withdrawable baskets were used, and a vertical type was found advantageous.

Fig. 3 shows a "retort" common in the foodstuffs and other industries. It is horizontal and internally steam heated, but non-agitated. The articles to be treated are run in on trucks; the large diameter, and small quantity of heat required render a steam jacket costly so that internal steam pipes were supplied.

Fig. 4 illustrates a rotating horizontal steam-jacketed autoclave where an agitator would have harmed the contents. The mixing is carried out by revolving the autoclave so that a "tumbling" effect is achieved, and the heating of the material by steam-jacketing the vessel.

Where the process of autoclaving requires temperatures higher than is generally to be found in the steam pressure available, resource is had to hot oil heating, electric heating or even fire heating under certain conditions.

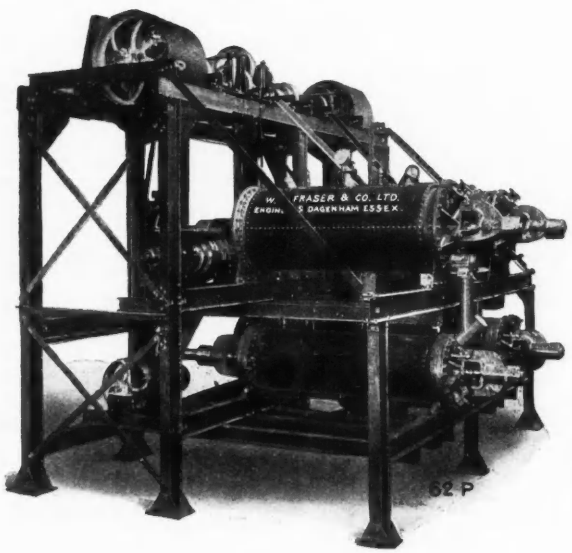


Fig. 3.—Large Horizontal Autoclave. (W. J Fraser and Co., Ltd.)

Fig. 5 (right).—Pressure Autoclave in "Staybrite" steel, 5 ft. diameter. (W. J. Fraser and Co., Ltd.)

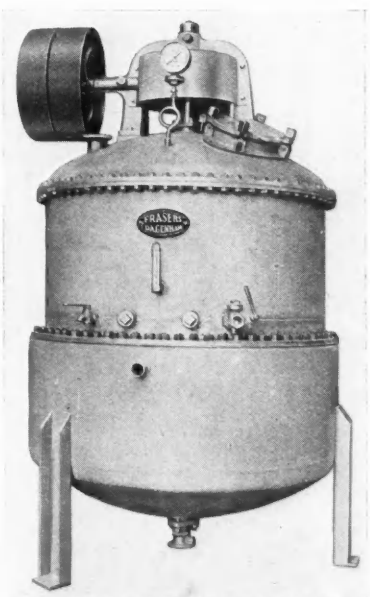
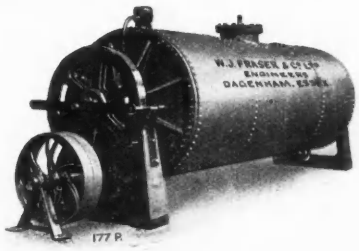


Fig. 1 (above).—Battery of Horizontal Autoclaves. (W. J. Fraser and Co., Ltd.)

Fig. 2 (left).—Small Vertical Autoclave with Basket. (W. J. Fraser and Co., Ltd.)

Fig. 4 (below).—Rotating Horizontal Autoclave. (W. J. Fraser and Co., Ltd.)



A problem of equal importance to the above is the choice of material of construction The factors governing this are less numerous and the principal ones are internal temperature and pressure; corrosion or contamination; heat transfer. The commonest materials in everyday use are (1) cast steel, forged steel, cast iron and mild steel; (2) enamelled iron or steel, stainless steel, copper, nickel-clad steel and other corrosive-resistant materials of which there are a number available for selection and many manufacturers have experience of them.

High-pressure experimental autoclaves at the Chemical Research Laboratory, Teddington, are made of various types of forged steel. Cast steel is also a material frequently used in the laboratory, and both these materials are largely used on the commercial scale. The step, however, between laboratory and commercial scale autoclaves is not one which can be overcome by the simple use of a pantograph. Apart from the mechanical difficulties involved, the increased distances between the agitator elements and also the distance from the centre of the vessel to the heating surfaces for heat transfer. etc., call for careful thought. Cast iron is a material of construction which is not the most desirable. It presents a resistance to corrosion which sometimes renders it preferable to mild steel, but, owing to the properties of the material where pressure is used, the thickness of metal required gives bad heat transfer, and the poor elasticity renders the use of cast iron autoclaves over a working pressure of 200 lb. per sq. in. undesirable. Where the steam pressure in the jacket is at all high a mild steel jacket is advisable.

For low or medium pressure mild steel affords a very satisfactory metal. A slight departure from standard does not involve extensive pattern-work or delay in manufacture; the heat transfer is good. Both riveted and welded mild steel autoclaves are in extensive use for many present-day purposes, and by the insistence of a suitable electrode it is found in practice that welded autoclaves stand up to heavy duties.

Enamelled iron and steel autoclaves are in extensive use, although bad heat transfer is a characteristic of them; the choice of steel or iron for the basic material depends on the pressure. Certain acids render their use imperative. Fig. 2 shows an enamelled iron autoclave. Stainless steel is now a material which is being much used where the pressure is such that mild steel would be applicable. Vessels made of stainless steel give a superior heat transfer to enamelled iron, and weight is reduced. The experience gained in the last few years in working and welding the material has brought it considerably to the front, and initial expense is frequently justified by purer products or longer plant life. Fig. 5 shows a stainless steel autoclave, 5 ft. diameter for 100 lb. working pressure, fitted with mild steel steam jacket. Nickel-clad steel has been used more extensively in the United States than in this country, but the application of it is by no means inconsiderable. Copper, acid-resisting bronzes, monel metal, homogeneously lead-lined steel, etc., all have their applications.

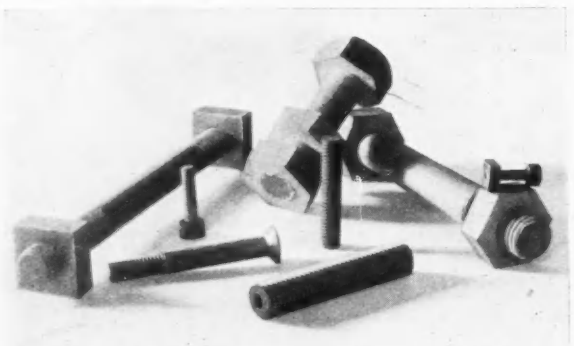
Considerable variation is available in the type of cover which is fitted to an autoclave, swing bolts or various special devices enable covers and doors to be removed frequently and quickly, but care should be taken that the correct type of joint is used when it is to be broken frequently. Some makers advocate the recessed type of joint, others the spigot type. When the cover is seldom taken off, a manhole is almost invariably fitted. Here again the type of autoclave and material affect the design, but the strength and the manner of jointing should be watched, and in cases where acid is concerned the bolts should be periodically examined. Other features requiring care in design include stuffing boxes and footstep bearings where agitators are fitted and pressures are high.

Modern autoclaves are frequently supplied with self-contained electric drives. Temperature and pressure recording instruments are not always necessary, but to ensure batch-to-batch consistency they are frequently invaluable; in all other cases a Bourden type pressure gauge and a thermometer pocket are fitted, the latter sometimes in a hollow shaft. Safety valves and devices are important, particularly where open steam is blown in or where an exothermic reaction is obtained. Jointing material depends on the substance treated but seamless copper asbestos, or compressed asbestos are very common.

A Useful Constructional Material

Gear Wheels and Bolts and Nuts

TUFNOL, which is supplied by Ellison Insulations, Ltd., is a laminated homogeneous material, made from either paper or fabric, impregnated with resin and pressed hydraulically at a high temperature. It has almost unlimited uses as a constructional material, and has the added advantage of being a first-class electrical insulator. Its weight is half that of aluminium; tensile strength is about equal to aluminium. The material is impervious to oil, petrol, steam, water and most acids and chemical fumes, and can be used under any climatic conditions without detrimental effects. It can be drilled, sawn, punched, tapped and otherwise machined with ordinary tools as if it were metal; furthermore, it is non-inflammable. One brand is made to withstand heat, another is specially suitable for punching, yet all brands possess the general qualities outlined above. Each brand can be supplied in sheet, rod, bar and tubes of many sections, or it can be moulded during manufacture into almost any desired shape.



Typical Tufnol Nuts and Bolts.

Tufnol is used extensively in the chemical and allied industries. In the artificial silk industry it is used for chlorine gas tubes, chemical vat linings, brackets, spinning pots and other parts which come in close contact with cellulose and sulphuric acid. Furthermore, the frames of some of the machines are insulated by Tufnol to safeguard the operatives from electric shock. In the electro-plating industry it is used for pickling trays and brackets, and for bearings which are immersed in acid.

Taking the chemical industry as a whole, Tufnol quiet gear wheels may be used for driving pumps, compressors, conveyors, and all kinds of machinery. These gear wheels may or may not be shrouded, depending upon the size of face and load to be transmitted. They can be run at greater pitch-line speeds than metal wheels, and, unlike raw hide and fibre wheels, they may be oiled without any detrimental effects.

The brands of Tufnol with the finest grain can be cut with precision, and are in demand for the manufacture of clock and instrument wheels.

For pumps, the impeller blades, plungers, gaskets and valves can be made from Tufnol, both for strength and resistance to the chemicals with which they come in contact; for compressors, the blades, valves and valve seatings can be made from this novel material. Tufnol is also used for filter press plates, spatulas in rubber manufacture, thermometer protectors, ball cages, doctor blades or scrapers in paper manufacture, nuts and bolts, conveyor wheels, rollers and belt facings.

The Important Question of Drying

Some Outstanding Types of Plant

THE question of drying is quite an important one for many industries, as generally at some stage of manufacturing a drying operation comes into consideration. Practically all materials or products requiring to be dried have to be handled according to conditions of manufacture. The type of dryer best suited for a particular industry in order to give good results requires careful consideration.

With the film or drum dryer, shown in Fig. 1, it is possible to obtain a finished dry powder direct from a liquid; the dryer is specially recommended for handling a liquid which cannot be filtered

Figs. 2 and 4 illustrate an enclosed stove of the compartment type, and the tunnel stove. Such stoves can be arranged as compartment stoves when only small batches are to be dried. For large quantities the stoves are generally arranged to form a "tunnel stove." These tunnel stoves can operate as batch dryers or they can be arranged to operate continuously by the material being constantly fed at one end of the tunnel and discharged at the other. Such stoves can be arranged for steam, electricity or gas heating.

The hot air stove shown in Fig. 3 is used for drying sacks, etc. The stove is fitted with a continuous travelling conveyor. The articles to be dried are fed on to the conveyor at one end, and then automatically discharged at the other end of the tunnel.

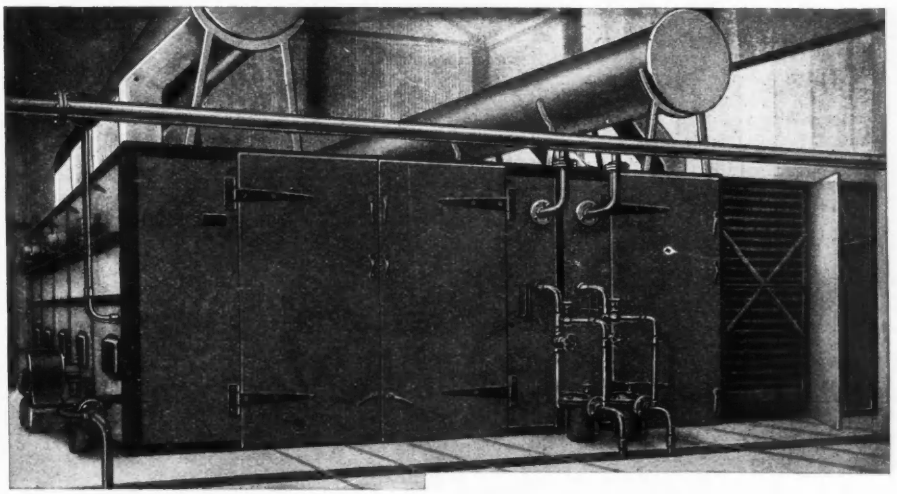


Fig. 3.—Hot Air Stove used for drying sacks, etc.

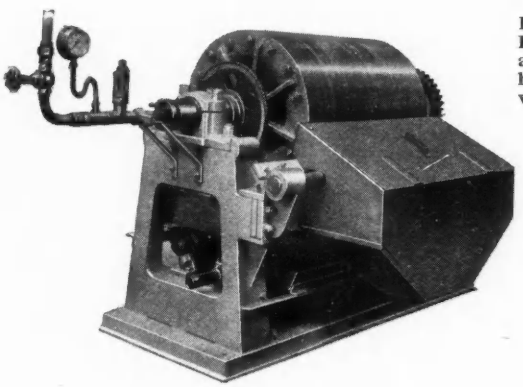


Fig. 1.—Film or Drum Dryer especially suitable for handling a liquid which cannot be filtered.

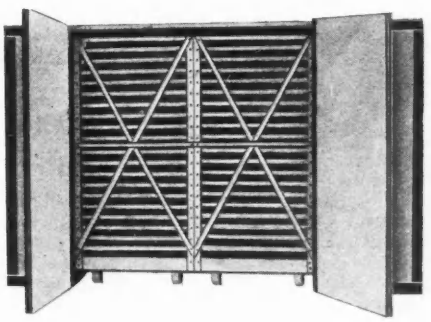


Fig. 4.—Enclosed stove of the compartment type.

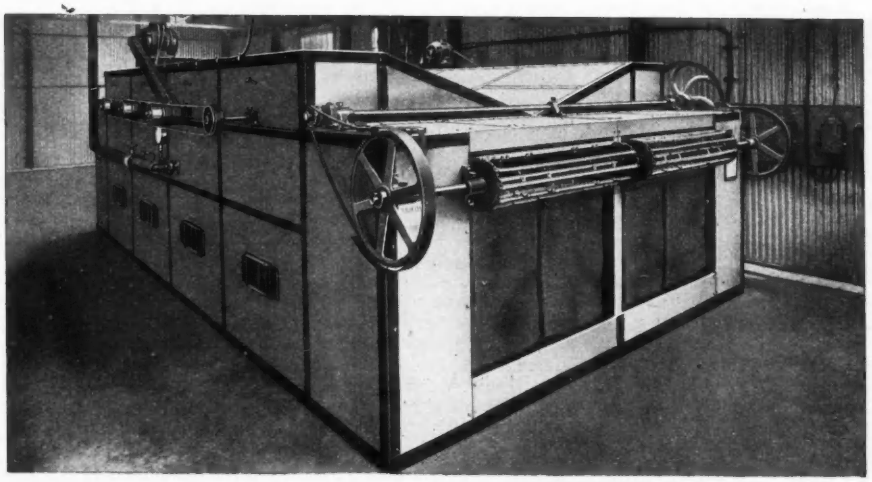


Fig. 2.—Tunnel stove capable of being arranged for steam, electric or gas heating.

Workmen Overcome by Fumes

One Dead in Glasgow Accident

A MAN lost his life by falling into a cesspool containing chemicals in a Glasgow tannery on February 6. The victim of the mishap was Patrick McDade, Glasgow, and the accident occurred in the tannery of W. and J. Martin, Baltic Street, Bridgeton. The pool is one of several, measuring six feet square by 25 feet deep, and contained waste water and chemicals to a depth of about seven feet.

It is approached by concrete paths on which hides are stacked. McDade was working near the pool and apparently overbalanced and fell from a ladder into the gaseous water. His cries quickly brought two of his fellow workmen, McKenna and Scott, to the scene. Without considering the danger he was running, McKenna dived into the pool and succeeded in reaching McDade, who was then semi-conscious and had apparently injured himself in the fall. The stirring of the water caused acrid fumes to rise on the surface, and McKenna, realising that he was becoming affected, shouted for assistance, Scott then descended to the water level, but he, too, was overcome. A man named John Knox, who had run to the pool to find out what was happening, saw the three men struggling for their lives, and quickly lowered a rope to them. They were soon brought to the surface and taken to the Royal Infirmary. On the way to the institution McDade died. McKenna and Scott were unconscious when admitted.

Claim for Director's Fees

Paint Chemist and Technologist

IN the Chancery Division on February 9, Mr. Justice Clauson concluded the hearing of an action by Mr. Harold Hays, a paint chemist and technologist, of Lordsbury Field, Wallington, against R. J. Hamer and Sons, Ltd., paint manufacturers, who had a factory at Mitcham, to recover £190 balance of fees alleged to be due as a director, at the rate of £200 a year, and £14 14s. 0d. balance of fees due to him as managing director, at the rate of £500 a year.

Defendants denied that anything was due, except the £14 14s. 0d. The defendants counter-claimed in respect of £290, which they said was paid to Mr. Hays in respect of the formation of the company and the preliminary expenses connected with it. They alleged that Mr. Hays procured the payment without a valid resolution of the company authorising it.

Mr. Hays said that as to £200 the company accepted responsibility and the money was properly accounted for. The remainder was paid for work done afterwards and was also accounted for in the company's accounts.

Evidence had been given as to the formation of the company and the passing of resolutions at a general meeting, fixing the directors fees and the payment of the expenses and other matters in issue.

Eventually, Sir Geo. Jones, for the defence, announced that the validity of the resolution that had been challenged would not now be disputed, nor would his lordship be troubled more about the question of preliminary expenses. The claim for managing directors' remuneration, £14 14s. 0d., was admitted, but so far as directors' fees were concerned a point in the defence was relied on.

His lordship found that Mr. Hays had established his claim to £190 2s. 9d. and there would be judgment for him for that sum and £14 14s. 0d., making a total of £204 16s. 9d., with costs. The counter-claim was dismissed with costs.

Coal Utilisation Council

A Reply to Critics

A LETTER from the Coal Utilisation Council to "The National Union of Manufacturers Journal" states that in the November issue of the Journal figures were quoted with the object of showing that the displacement of coal by oil is something inevitable. Since the imposition of the oil tax that displacement has been restored or "turned aside" to the extent of over 700,000 tons of coal per annum. The further statement was made that the Government was ill-advised when it placed the tax on fuel oil and "well advised when it decided to promote and encourage the extraction of oil from coal." The principal effect of the Government's measure of assistance is to stimulate the production, not of fuel oil but of petrol, though fuel oil can, of course, be produced from coal either by hydrogenation or low-temperature processes.

Secondly, there is a market for marine purposes for all the fuel oil that is likely to be produced from British coal for many years to come. Thirdly, if, as is claimed, the advance of oil cannot be resisted, it would be a good policy to hasten the day when the production of that oil can be obtained from our indigenous fuel, while at the same time encouraging the use of that fuel in its natural form pending the arrival of the day. It may be retorted that this has the effect of "penalising" progressive industries. In an address given at the Manchester College of Technology recently, Mr. H. L. Pirie, Chief Engineer of this Council, however, gave a number of examples of conversions and tests, the savings in favour of coal being very striking.

Manchester Chamber of Commerce

Report on Chemical and Allied Industries

THE Annual Reports for 1934 issued by the Manchester Chamber of Commerce state that, regarding the chemical industry, one thing is indisputable, namely, that a turn in the fortune of the Lancashire textile industry would be a welcome and heartening sign to those engaged in the chemical trade. In last year's report reference was made to the consideration which was being given to a proposal to subdivide the section into units which would represent respectively—(*a*) manufacturers, (*b*) distributors and (*c*) users. The matter was carried forward to a meeting of the executive in March after it had been debated at the annual meeting. After exhaustive discussion it was decided not to proceed with the proposition. The feeling of the executive was that the constitution of the section should remain undivided because it provided a means whereby questions affecting the general interests of the industry could be discussed by all concerned.

A matter which engaged the close attention of the Chamber arose from representations of members whose business activities in the United Kingdom were being seriously affected as a result of the advantages enjoyed by German exporters through the use of Scrip Marks. The question was taken up with the Government Department concerned and the reply received was reported to the executive.

Letter to the Editor

New Unshrinkable Process

SIR,—The Wool Industries Research Association has been carrying out a series of investigations on the shrinking of wool, and the public has from time to time been notified of these experiments in the Press. A point, however, which does not seem to have been emphasised sufficiently is that the process is not yet fully developed for commercial use. In every application of science to industry, it has always been found that a considerable time must elapse between the working out of a method in the laboratory, and the time when it actually becomes a part of the manufacturer's routine.

We are of the opinion that the references to the new unshrinkable process in the Press (which have never been inspired by us) have given an incorrect impression to those interested in hosiery goods. It has been suggested that the new process is already an accomplished fact, and that goods treated by it should be available. This is not the case. We still have more work to do in solving the further problems which occur in transferring the operation of such a process from the laboratory to a commercial scale. In accordance with these facts, it is certain that underwear or other knitted materials, finished by application of the Wool Industries Research Association's new unshrinkable process, will not be available to the trade before 1936. We hope that this statement will correct any false impressions which may have arisen.—Yours faithfully,

ARNOLD FROBISHER,
Secretary.

Wool Industries Research Association,
Torridon, Leeds.

British Celanese v. Courtaulds, Ltd.

House of Lords Judgment in Patents Dispute

JUDGMENT was delivered in the House of Lords on Monday on the appeal of British Celanese, Ltd., from a decision of the Court of Appeal affirming a judgment of Mr. Justice Clauson in favour of Courtaulds, Ltd. The appeal had been argued before Lord Tomlin, Lord Russell of Killowen and Lord Macmillan. The dispute was in regard to two Celanese patents for the manufacture of artificial silk, one dated 1920 and the other 1922. Mr. Justice Clauson had made an order on a counter-claim by Courtaulds, revoking the two patents on the ground that they had been anticipitated by prior specifications and lacked patentable subject matter.

Lord Tomlin, in his judgment, said it was admitted that what Courtaulds were doing amounted to infringement and the only question was as to validity. Of the two patents, that of 1920 was of outstanding importance. The only process before 1920 in use in this country was developed by Courtaulds and was known as the viscose process. The manufacture of artificial silk from cellulose with acetone as a solvent was first begun by Celanese after 1920, operating, as Celanese alleged, the process covered by the patent under consideration. In 1926, Courtaulds began to manufacture artificial silk from cellulose acetate, with acetone as a solvent, and had continued to do so without, however, discontinuing their viscose process. In that manufacture, Courtaulds used a process and apparatus which were admittedly infringements of the 1920 patent if that patent was valid.

Features of the 1920 Patent

In the process and in the apparatus claimed in this patent there was a collocation of four integers: (1) Downward exclusion; (2) an enclosing casing; (3) a counter-current of hot air and (4) outside winding; and the question that arose was whether the collocation of integers was novel in 1920; secondly, if novel, whether it had subject-matter, and, thirdly, whether, even if novel and *prima facie* possessing subject-matter it was obvious in 1920 that it had been anticipated.

Having described a number of patents for artificial silk earlier than 1920, Lord Tomlin said, assuming the collocation of the four integers he had mentioned was itself novel, the question was what was the inventive idea connected with the collocation which constituted subject-matter. That was a topic upon which there had been much debate in the Chancery Court, in the Court of Appeal and in the House of Lords.

"The view presented by counsel for Celanese to the House of Lords," Lord Tomlin said, "was, I am satisfied, a view which the Court below had not had an opportunity of considering. It was accepted as sound law that the mere placing side by side of old integers so that each performed its own proper function independently of any of the others was not a patentable combination, but that where the old integers, when placed together, had some working inter-relation producing a new or improved result, then there was patentable subject-matter in the idea of the working interrelation brought about by the collocation of integers."

Lack of Subject Matter

It was said in the present case that the inventive idea lay in having a collocation of integers which worked in inter-relation so as to produce a new and improved result. That argument, if it had an attractive façade, was, in his lordship's opinion, raised upon an unsound foundation. The specification contained no reference to the result to be obtained, nor did it limit or qualify the character of any of the integers so as to give a special quality for inter-related working with the other integers or any of them. In fact, there was no inter-related working between the integers in the sense that any one of the integers was doing something it could not do without the presence or one or more of the others. Each integer was performing its own part and was not functionally dependent upon the presence of any other integer. "I think, therefore," his Lordship said, "the invention lacks subject matter.

It was said that that could not be the right conclusion, because a great industry sprang up after 1920 from the use of the process and that the commercial utility of the process established the presence of an inventive quality. That seemed to him to be putting the matter too high. What, in fact, was done as a result of the use of the process had never been substantially proved, and, in his opinion, the Celanese prospectus of March, 1920, and the report of the chairman's speech in May, 1922, made it impossible to say the commercial utility of the process was established then. If any inference was to be drawn, it was not the process but the work done in connection with it in the works, acting, in the language of the chairman, as "a colossal laboratory of research and experiment," which produced such commercial success as was won.

Moreover, there was no evidence that the process had ever been tried or could be worked with any dope, except cellulose acetate dissolved in acetone, and the evidence of commercial utility, such as it was, did not therefore explain the full width of the process. That it should do to enable commercial utility to be advanced for the purpose desired by Celanese. It seemed to him that, having regard to the common knowledge of 1920, what was done was obvious. In Bersch's book on cellulose and cellulose products, which was published long before 1920, there was described a combination of four integers which constituted the combination in the Celanese patent, and the patent must, in his opinion, fail for want of novelty.

Passing to the second patent in dispute, Lord Tomlin said it related to the employment of a spinning device. A spinning device of this kind was in use for one hundred years in the textile industry. It was enough to say that in the matter of this patent he agreed with the conclusions and reasons of the Court below.

The Expert Witness

"The proceedings in the trial court," Lord Tomlin said, "provide an illustration of the licence which in cases of this kind is enjoyed by expert witnesses and by counsel examining them. In my judgment, the time has come to curtail the licence, whatever the difficulties involved in doing so. The expert witness is not entitled to say, nor is counsel entitled to ask him, what the specification means; nor does the question become any more admissible if it takes the form of asking him what it means to him as an engineer or as a chemist. Nor is he entitled to say whether any given step or alteration is obvious, that being a question for the Court. In the present case much time was occupied, and a substantial part of the shorthand note filled, with questions and answers which, in my opinion, were not admissible."

Commenting upon this, Lord Tomlin said: "In the first place, time is wasted and money is spent on what is not legitimate. In the second place, there accumulates a mass of material which, so far from assisting the Judge, renders his task the more difficult, because he has to sift the grain from an unnecessary amount of chaff. In my opinion, the trial courts should make strenuous efforts to put a check upon an undesirable and growing practice."

Lord Tomlin said that in his opinion the appeal failed. Lord Russell of Killowen and Lord Macmillan agreed, and the appeal accordingly was dismissed with costs.

A Superior Grade of Ebonite for Chemical Works

SINCE Dexonite super ebonite was first introduced over thirty years ago, constant attention has been devoted to the improvement of this form of vulcanised rubber, with the result that it now enjoys an unrivalled reputation for strength, durability, imperviousness to changes of temperature, perfect electrical insulation and excellent machining qualities. The material is not brittle and is therefore much superior to earthenware when a corrosion-resisting material is required for pipe lines, cocks and valves, hydrant balls and the lining of tanks and pumps. Amongst the many uses of Dexonite super ebonite, attention is particularly drawn to its suitability for specialised roller covering, piston rings, renewable valve discs and every description of mouldings for which a high-class product is essential. The makers are Dexine, Ltd.

Notes and Reports from the Societies

Institution of the Rubber Industry

Some Little-discussed Properties of Rubber

THE causes of discoloration in vulcanised rubber were discussed by Mr. B. L. Davies, M.Sc., A.I.C., A.I.R.I.(Sc.), in a paper read at a meeting of the Preston Section of the Institution of the Rubber Industry on February 4. This discoloration, he said, renders it impossible to produce a colourless, stable transparent rubber, or even a good white stock without excessive loading.

A number of non-rubber substances normally present in plantation rubber contribute towards its discoloration. The yellow pigment carotin, present in pale crepe, is closely associated with the resin, both being extracted by acetone. There is also a natural antioxidant which probably plays a part. The iron content of raw rubber increases enormously during milling, giving organic iron derivatives. During processing, contamination with pigments of high tinting strength is liable to cause discoloration, a trouble which is met by the use of master batches. Vulcanisation also brings about a deepening of the brown tint, the depth being related to the combined sulphur and not to time of heating. It is therefore advantageous to use the fastest accelerators for white and transparent goods. Many accelerators produce a specific stain and careful selection is necessary. The antioxidants also stain, even the so-called non-staining examples developing the stain on ageing. This may be due to formation of organic iron compounds which are known to be produced when iron salts are added to a solution of an antioxidant. It is probable that the natural antioxidant stains in this manner. It has been found that the stain acts as a dye and is light-protective to the rubber. The fact that the reducing action on silver salts of the natural antioxidant is destroyed by ultra-violet light has been applied to the formation of pictures on rubber.

The colour of transparent rubber depends largely on the presence of rubber-soluble stains, while its transparency is controlled by the degree of freedom from rubber-insoluble matter. Excepting magnesium carbonate, most of the usual fillers are unsuitable. Sulphur, as accelerator and activator, must neither contain nor produce insoluble matter or bloom. The rubber industry is in need of a non-staining antioxidant which will give protection against light as well as heat ageing. If such a compound could be found it should be possible to manufacture stable colourless transparent goods and important developments would follow.

British Association of Chemists

London Section Smoking Concert

A SMOKING concert was held by the London Section of the British Association of Chemists at the Broad Street Station Restaurant, on February 8, attended by the president, Professor E. C. C. Baly. An enjoyable programme was arranged by Mr. Roff, who was assisted by the Misses Stella Brown and Kate Stevens, Messrs. Edmund Bird and E. J. Gardner.

Professor Baly said he had been closely connected with the working of the Association for the last three years—since he had held the position of president. During this period he had learnt a great deal about the Association, which was largely run by the unselfish efforts of honorary officers and others who had other work to do and who carried on in their "spare time." The Association had grown from a small beginning in 1916. During the great slump it did much to help those affected by the industrial depression. The unemployment fund was of material assistance to those out of employment. The Association was growing rapidly and a day might come when the constitution had to be reconsidered. In the new situation arising the rapid growth of the London Section would inevitably have to be considered. There was an increasing tendency for trade, manufacture and prosperity to gravitate to the south. The strength of the large sections not only rested in the numerical numbers but the greater variety of constructive suggestions which came from members.

Miss Wright thanked the president and reminded members that, in accordance with their wishes, an informal party was being arranged for March 8, at the Holborn Restaurant, where there would be a cabaret and dancing.

Oil and Colour Chemists

Manchester Section : Fastness to Light

THE Manchester Section of the Oil and Colour Chemists' Association held a members' evening at the Reynolds Hall, College of Technology, Manchester, on February 8. Dr. V. G. Jolly was in the chair, and the subject under discussion was "Fastness to Light." The subject was introduced from four angles by different speakers, after which the meeting was open for free discussion.

The colour makers' point of view was expressed by Mr. J. Barker, who confined his remarks chiefly to the lead chrome pigments rather than a survey of the whole field of colours. He discussed the difference in fastness to light of the different forms of acetate and nitrate chromes and the effect produced by varying the methods used in manufacture. The second contribution was made by Mr. Idle, who spoke from the standpoint of the printing ink trade. He enumerated a number of cases of printing inks applied to different types of display work explaining the varying lengths of exposure required without serious deterioration taking place. As yet there was no very clear understanding between the colour maker and the printing ink manufacturer on the question of fastness to light. This, he pointed out, resulted in the latter having recourse to their own methods of testing for their particular trade. He emphasised the different results obtained by using different whites as the reducing medium for strong colours.

Mr. C. S. Farmer, who took the place of Mr. E. J. Bond, gave a résumé of the result of light action on the various paint media and the effect on the dried paint films. The academic viewpoint was put forward by Mr. A. Hancock. He reviewed the research work done recently in Manchester and elsewhere on the fastness of certain dyes either alone or in a mixed form. He lucidly explained certain reactions which were considered to take place when two fast dyes used in conjunction giving rise to the fading of one of the components.

Institution of Chemical Engineers

Arrangements for Annual Meeting

THE thirteenth annual meeting of the Institution of Chemical Engineers will be held at the Hotel Victoria, London, on Friday, February 22. At the corporate meeting at 11 a.m. the Osborne Reynolds Medal, the Moulton Medal and the Junior Moulton Medal will be presented, and Mr. W. Macnab will deliver his presidential address on "Chemical Engineering in Explosives Manufacture." Following an informal luncheon, Dr. A. J. V. Underwood will present for discussion a paper on "The Historical Development of Distilling Plant," dealing with early types of distilling apparatus used by the Greek alchemists and by the Arabs, distillation in the Middle Ages and the centuries following, early attempts to improve the efficiency of fractionation, and the beginnings of continuous distillation.

The annual dinner will be held in the evening in the King Edward VII rooms at the Hotel Victoria, at which there will be many distinguished guests, including the presidents of a number of kindred institutions and societies. Among the speakers will be Lord Macmillan and Lord Herbert Scott, president of the Federation of British Industries.

Institute of Chemistry

Newcastle Section : Types of Chemical Linkage

A REFRESHER lecture on "Chemical Linkage" was given by Dr. R. D. Haworth to the Newcastle-upon-Tyne Section of the Institute of Chemistry on January 31.

It was the discovery of the electron, in 1897, and of the proton, in 1910, said Dr. Haworth, that the idea arose that the atom contained a positively charged nucleus with enough external electrons to balance its charge. This charge, the so-called atomic number, was directly determined by Moseley

in 1913, and corresponds to the original number of the element in the periodic table. Between 1913-5 Bohr developed the theory of atomic structure according to which certain orbits known as K, L, M, etc., existed, in which the electrons could revolve without radiating energy, such changes occurring only on transfer from one orbit to another. This sufficed for the derivation of the hydrogen spectrum, but further work showed that in more complex elements the total number of electrons which each orbit (as defined by the quantum numbers) could accommodate was given by $2n^2$, where n is the number of the orbit. These values are numerically 2, 8, 18, 32 for the K, L, M, and N orbits respectively. The filling up of the "shells" goes regularly to scandium at which, by a sort of domestic quarrel, the M level begins to expand above 8 until at nickel we have 2, 8, 16, 2 electrons in the successive shells and at copper 2, 8, 18, 1. In the rare earths the N level expands to 32. Inert gases have 8 electrons in their outermost shells (He has 2), and elements in the same family have the same numbers of electrons in the last shell.

In 1916, Kossel suggested that elements combined by an exchange of electrons which made up all atoms concerned to the inert gas state, while the resulting electrostatic charges held them together. These are the ionising electrovalent compounds, with no directed valency bonds. In the middle of the table these charges would be large, but G. N. Lewis suggested in the same year that these could share electrons giving the non-ionising co-valent compounds with directed valency and stereochemical possibilities. Langmuir developed the octet rule, that an atom will, if possible, react until it is surrounded by eight electrons. There are exceptions, such as SF_6, but atomic and molecular stability do not necessarily demand the same conditions. In the simpler cases each atom supplies one electron, but Lewis suggested that atoms with an unshared "lone pair" might donate both, giving an electrovalency superposed on a co-valency—the so-called co-ordinate link. This is usually formulated by a bond with a half arrow head pointing from "donor" to "acceptor" A—B.

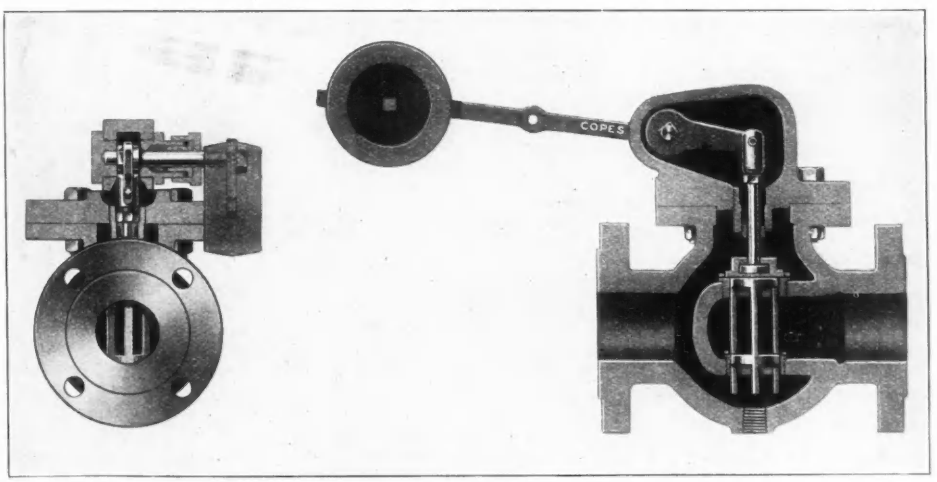
Some elements show a co-valency greater than four, so that either the octet rule of Langmuir or the Lewis 2-electron bond must be given up. Sugden preserves the former and advances the "singlet" link, such as the H_2 ion must have. Sidgwick abandons the octet rule, expanding the valency shell of S in SF_6 to 12, and that of Os to 16 in OsF_8. Samuel and Hunter (since 1927) are more revolutionary still, they abandon the co-ordinate link and see in electro- and co-valency only two extreme states of a continuous series. Mulliken and Lennard-Jones have also advanced physical objections against the singlet link except in joining two identical nuclei.

New Departures in Remote Control

Some Representative Uses

CENTRALISED remote control of flows of gases and liquids under pressure is a field of increasing interest still in the development stage. In almost every process industry unlimited possibilities present themselves, especially in such spheres as oil refineries, pulp and paper mills, sugar mills and breweries. Disadvantages in valve design have been overcome in the combination of the Copes control valve and electric thrustor in remote valve operation. Valve sticking has been one of the difficulties of the past, due to high friction of the ordinary reciprocating valve spindle. This depends on the condition of the valve packing and consequent tightness of the gland. Furthermore, the reciprocating movement of the spindle may carry dirt and scale into the packing with consequent troubles. The Copes control valve was patented in Great Britain in 1918, the chief claim being the rotating spindle, which gave a much lower friction than heretofore. Moreover, the plunger of the Copes valve was capable of design which gave less out-of-balance while dealing with large flows and high differential pressures. A working arrangement has been made with the B.T.H. (British Thomson-Houston) Co., Ltd., of Rugby, permitting the use of their patent thrustor for the automatic operation of balanced control valves. The B.T.H. thrustor is a new electro-hydraulic device designed to exert a smooth straight-line constant pressure thrust. The Copes control valve is most suitable for this service, as the rotating spindle design requires the least possible power for operation. This new unit combines an easily moved control valve with a positive power source, so as to afford an ideal automatically moved valve suitable for local or remote electrical control.

Previously, automatic valves of this nature have been operated by a motor geared drive or by a solenoid. The motor geared drive is cumbersome and slow, while the solenoid movement embodies a quick-moving thrust tending to slam the valve into operation, with consequent shocks to the pipe line. The solenoid is basically unsuitable for valve operation, as the power at starting is a minimum just when the maximum power is required if the valve should stick. To overcome this handicap the solenoid has to be much larger than is necessary for normal operation. The Copes electric thrustor valve provides a unit which moves positively and quickly, with no possible motor overload or valve slamming.



Cope's Control Valve showing low friction rotary spindle and high lift ported valve.

Aluminium Facts and Figures

MEMORANDA published recently by the British Aluminium Co., Ltd., gives the leading facts and figures concerning aluminium. The first section of the book, dealing with the forms and sizes of aluminium, gives also its chemical and physical properties as well as the main formulæ for calculating weights of circles, tubes and entruded sections of the metal. The second section, describing the finishing and working of aluminium has chapters on anodising, forging, machining and welding, while the book concludes with a useful index.

Continental Chemical Notes

Esthonia

THE ESTHONIAN GOVERNMENT is participating in the establishment of a sulphite cellulose factory with a projected annual capacity of 20,000 tons.

Spain

SODIUM PERBORATE MANUFACTURE has now commenced at the Leon works of the Union Quimica Española.

THE BARCELONA CONCERN, Aniceto Matamala Fernandez, intends to manufacture haematin.

France

ETHYLENE OXIDE can be prepared by direct oxidation of ethylene without risk of explosion if the reaction mixture (with air or oxygen) is diluted with a large proportion of carbon dioxide. In the presence of the latter inert gas, the formation of ethylene oxide proceeds smoothly under pressure. Successful working depends upon the use of a catlyst in the shape of silver in the pure state or activated with a small proportion of gold or copper (French Pat. 771,650).

Italy

WASTE AND REGENERATED LUBRICATING OILS are to be utilised in Italy in destroying the malaria-carrying anopheles in place of arsenic compounds and petroleum.

CHEMICAL TREATMENT of hemp waste yielding a material resembling cotton is being applied in a new factory at Castellanza. When the new plant attains its maximum output, Italian raw cotton imports are expected to be cut down by one-half. Italy is one of the principal hemp-producing countries ("Chemische Industrie").

Russia

AN EXPERIMENTAL PLANT is being built for the manufacture of radium from uranium ores in Taschikikstan.

Lithuania

THE STATE FORESTRY DEPARTMENT proposes to erect a turpentine and rosin factory.

Germany

AT THE END OF 1933 some 150 electric arc ovens were being used in Germany for making carbide and ferro-silicon and for fusing metals in general.

MALEIC ANHYDRIDE is used as a raw material for plasticisers, synthetic resins, dyestuffs and medicinal substances by applying the Friedel-Craft reaction in conjunction with certain substituted aromatic hydrocarbons (German Pat. 607,380).

SELENOUREA AND ITS DERIVATIVES are now obtained by exposing aqueous solutions of cyanamide or its derivatives to the action of hydrogen selenide (German Pat. 607,382). The new products may find application as insecticides and in photographic chemistry.

HAY HAS BEEN EXAMINED as a source of vitamin B2 (lactoflavin), one of the growth-promoting group of vitamins, by Kuhn and Kaltschmitt (Berichte, January, 1935). Extraction of 103 kilos dried lucerne with 1,480 litres boiling water yielded 50 to 70 milligrams of vitamin B2 (calculated as the tetra-acetyl compound).

A NEW DESIGN of photo-electric colorimeter is said to eliminate the possibility of visual error when estimating pH values and measuring the transparency of paper, colour filters, photographic emulsions, etc. (Dr. B. Lange, Berlin-Dahlem). Numerous other analytical applications are suggested by the makers.

Personal Notes

MR. JOHN HAY STEEL, until his retirement employed at Nobel's Explosives Factory at Ardeer, has died at the age of 86.

MR. ROBERT SINCLAIR DIXON, research and laboratory chemist, at the University of South Wales and Monmouthshire, died last week.

MR. GEORGE MADEL is to offer his resignation as secretary of the Society of Chemical Industry, Swansea Section, to take effect from the annual meeting next month.

MR. WILLIAM BURTON, a leading authority on the manufacture of iron, and for many years manager and director of the Wigan Rolling Mills, died on February 6 at the age of 93.

MR. PERCY H. JOHNSTON, president of the Chemical Bank and Trust Co., New York, has relinquished the presidency, which he has held since 1920. As chairman of the board he will continue as the chief executive officer of the bank. Mr. Frank K. Houston, formerly first vice-president, has given elected president, and Mr. N. Baxter Jackson first vice-president. Mr. Joseph A. Bower has been re-elected executive vice-president.

MR. E. A. ALLIOTT provided a delightful entertainment for a party of friends at Craigs Court Restaurant, Whitehall, on February 8, when he gave a private display of his 16 mm. films of Devon and Holland, with some colour shots of Chiltern beauty spots and the Old Berkeley Hunt. The show also included an excellent film of the marriage of the Duke and Duchess of Kent, taken from the window of Mr. Alliott's Office in Parliament Street.

MR. WILLIAM GREENHALGH, chemical manufacturer, of Radcliffe, Lancs, has died suddenly at sea. Mr. Greenhalgh left Radcliffe on January 26 for a holiday cruise to Africa and was expected back in April. Mrs. Greenhalgh heard of his death by a radiogram from the ship on February 6, her husband having died suddenly the previous day off the African coast, and was buried at sea. Mr. Greenhalgh was 63 years of age, and leaves a widow and a daughter.

MR. EMILE AUGUSTE FOURNEAUX, who died last November, left £20,229.

COLONEL W. NORMAN PILKINGTON, a director of the glass-making firm of Pilkington Bros., died at St. Helens, on February 8, aged 56.

COLONEL JOHN SMART MATTHEW, until eighteen months ago sales director of the Dunlop Rubber Co., has died at Sutton Coldfield, aged 70.

MR. J. BLAIR gave an interesting talk on "Dyeing to Live —1189-1935" at the Chemical Club on Monday evening. A large attendance was presided over by Dr. Herbert Levinstein, and the proceedings were in accordance with the traditions of club evenings, Mr. Blair's discourse being of an informal, but none the less informative, character.

MR. B. H. WILSDON has been appointed director of research to the Wool Industries Research Association at Torri-Frank K. Houston, formerly first vice-president, has been assistant director and superintendent of the Building Research Station of the Department of Scientific and Industrial Research. He was educated at Lincoln College, Oxford, and after academic research there, went to India as a professor of chemistry, subsequently gaining varied experience in applied research in agriculture and organising the Irrigation Research Institute of the Punjab. Besides publishing work on chemical and physical subjects, he has done pioneer work on the application of statistical methods to industrial problems of specification and standardisation.

THE New Zealand trade in kauri gum continues its recent tendency towards stabilisation, and the new policy, it is said, has not produced satisfactory results. Demand is for the lower grades of kauri gum. The policy of the Government to subsidise the lower grades of gum from the unemployment relief funds has not resulted in any appreciable increase in export values. November exports of kauri gum totalled 256 metric tons (valued at 6,247 New Zealand pounds).

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Drying Oils

A MODIFIED drying oil is prepared by mixing raw tung oil with a higher fatty acid and/or a resin acid and heating the mixture to yield a product having an acid number of at least 100. In examples, tung oil is heated with (1) tung oil fatty acids to yield an oil, the ammonium derivative of which is a soap; (2) rosin; (3) rosin and tung oil fatty acids; (4) linseed oil fatty acids and tung oil fatty acids; and (5) linseed oil and linseed oil fatty acids. See specification No. 412,558 of American Cynamid Co., and T. F. Bradley.

Dyes for Colouring Rubber

DISAZO dyes fast to vulcanisation are made by coupling tetrazotised *o*-dianisidine (1 mol.) with 2 mols. of a 1-phenyl-3-methyl-5-pyrazolone containing at least one alkyl group in the phenyl nucleus. They are suitable for colouring rubber, celluloid and products capable of being hardened obtainable by condensation of phenol and urea, formaldehyde and urea, or formaldehyde and casein in yellow-red shades. The dyes are insoluble in benzene and rubber. In an example, 1-(4¹-methylphenyl)- and 1-(2¹ : 4¹-dimethylphenyl)-3-methyl-5-pyrazolones are specified as components. The Provisional Specification refers to the use of homologues of 1-phenyl-3-methyl-5-pyrazolone as coupling components. See specification No. 412,992 of J. Y. Johnson.

Complete Specifications Open to Public Inspection

CLEANSING CREAMS containing magnesium hydroxide, manufacture.—C. H. Phillips Chemical Co. July 29, 1933. 20469/34.

NITRODIBENZANTHRONES, manufacture and production.—I. G. Farbenindustrie. Aug. 4, 1933. 22180/34.

TRICHLOROMETHYL-OXYARIL CARBINOLS and of oxy-acids and oxy-aldehydes therefrom, manufacture.—Howards and Sons, Ltd. July 29, 1933. 22195/34.

HYDROGEN PEROXIDE, manufacture.—E. I. du Pont de Nemours and Co. July 29, 1933. 22243/34.

Specifications Accepted with Dates of Application

BACTERICIDAL and therapeutic agent.—Standard Brands, Inc. June 21, 1932. 423,354.

HYDROCARBON OILS, dewaxing.—Alco Products, Inc. Sept. 9, 1932. 423,303.

AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., M. Mendoza, and F. L. Rose. June 23, 1933. 423,237.

INSECTICIDES.—Imperial Chemical Industries, Ltd., and F. L. Sharp. July 4, 1933. 423,504.

AMMONIACAL LIQUOR containing phenolic bodies, treatment.—W. C. Holmes and Co., Ltd., C. Cooper and D. M. Henshaw. July 25, 1933. 423,361.

PLANT for producing and treating ammonium sulphate.—T. O. Wilton and Chemical Engineering and Wilton's Patent Furnace Co., Ltd. July 25, 1933. 423,432.

ORGANIC MERCURY COMPOUNDS and their manufacture.—E. I. du Pont de Nemours and Co. July 28, 1932. 423,506.

HYDROCARBONS of low boiling point by the heat-treatment of oils of high boiling point, petroleum residues, tars, and the like, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 29, 1933. 423,507.

DYESTUFF INTERMEDIATES of the anthraquinone series and their production.—E. I. du Pont de Nemours and Co. Aug. 1, 1932. 423,446.

DYESTUFFS of the anthraquinone series and their production.—E. L. du Pont de Nemours and Co. Aug. 1, 1932. 423,447.

LIQUID-OXYGEN EXPLOSIVES.—L. Mellersh-Jackson (L'Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude). Aug. 3, 1933. 423,513.

HALOGENATED ETHERS, manufacture.—E. I. du Pont de Nemours and Co. Aug. 4, 1932. 423,520.

AZO DYESTUFFS and their manufacture.—E. I. du Pont de Nemours and Co. Aug. 4, 1932. 423,521.

HALOGENATED VAT DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). Aug. 15, 1933. 423,450.

DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Sept. 20, 1932. 423,256.

SULPHUR and/or sulphuretted hydrozen, or mixtures of sulphuretted hydrogen, sulphur dioxide, aend sulphur from materials containing sulphur, recovery.—Metallges. Oct. 3, 1932. 423,451.

CHLORINE or other gas for the treatment of liquids, apparatus for supplying.—Bell Bros. Manchester (1927), Ltd., and C. G. Benson. Oct. 10, 1933. 423,258.

CARBON BISULPHIDE from freshly-spun viscose artificial silk, apparatus for the recovery.—Ruth-Aldo Co., Inc., and G. B. Regalia. Dec. 12, 1933. 423,275.

ADSORBENTS and methods of manufacture thereof.—H. E. Potts (J. Wyeth and Bro., Inc.). Dec. 28, 1933. 423,541.

COLOURING OXIDE FILMS on aluminium or on its alloy, process.—Soc. of Chemical Industry in Basle. Feb. 16, 1933. 423,467.

BERYLLIUM COMPOUNDS from beryllium-bearing minerals, production.—C. Adamoli. Feb. 6, 1934. 423,543.

PRIMARY SODIUM PHOSPHATE and boric acid, simultaneous manufacture.—Chemische Fabrik Budenheim. Nov. 2, 1933. 423,295.

AMMONIUM SULPHATE, production.—Directie van de Staatsmijnen in Limburg. Oct. 16, 1933. 423,397.

Applications for Patents

(January 31 to February 6 inclusive.)

REMOVING CONTAMINATING METALS, ETC., from zinc-bearing materials.—Associated Metals and Minerals Corporation and A. L. J. Queneau. 3212.

REFINING SELENIUM.—Bolidens Gruvaktiebolag. (Sweden, June 6, '34.) 3745.

SYNTHETIC RESINS, manufacture.—British Cyanides Co., Ltd., and A. Brookes. 3218.

RAYON YARN, manufacture.—E. G. Budd Manufacturing Co. (United States, Feb. 3, '34.) 3478.

RUBBER MIXTURES, etc., manufacture.—A. Carpmael (I. G. Farbenindustrie). 3386.

PRODUCTS FROM BORON FLUORIDE, etc., manufacture.—A. Carpmael (I. G. Farbenindustrie). 3615.

CONDENSATION PRODUCTS OF OLEFINES, manufacture.—A. Carpmael (I. G. Farbenindustrie). 3616.

ACID COMPOUNDS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 3617.

LIQUIDS, purification.—A. Carpmael (I. G. Farbenindustrie). 3619.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 3733.

GLUCOSIDE-LIKE COMPOUNDS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 3614.

PREGNENDINE, production.—A. Carpmael (I. G. Farbenindustrie). 3885, 3886.

AURIFEROUS MATERIAL, refining.—Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. (Germany, Feb. 6, '34.) 3634.

ALBUMINOUS ARTIFICIAL MASSES, manufacture.—Deutsche Hydrierwerke A.-G. (Germany, Jan. 31, '34.) 3228. (Germany, March 31, '34.) 3229.

WASTE PAPER, purification.—Deutsche Hydrierwerke A.-G. (Germany, Jan. 31, '34.) 3230. (Germany, Feb. 12, '34.) 3231. (Germany, June 16, '34.) 3232.

FINISHING, ETC., CELLULOSE PRODUCTS.—Deutsche Hydrierwerke A.-G. (Germany, Jan. 31, '34.) 3233. (Germany, March 31, '34.) 3234. (Germany, July 10, '34.) 3235.

NITRODIPHENYLAMINE CARBOXYLIC ACID, manufacture.—E. I. du Pont de Nemours and Co. and L. Spiegler. 3639.

COLOUR POWDERS, manufacture.—E. I. du Pont de Nemours and Co. (United States, Feb. 5, '34.) 3724.

MIXTURE OF NITROGEN AND HYDROGEN, production.—G. Fauser. (Italy, Feb. 2, '34.) 3453.

MOULDED GLASS ARTICLES, manufacture.—P. V. W. Gell. 3906.

RUBBER, vulcanisation.—B. F. Goodrich Co. (United States, Feb. 20, '34.) 3367.

ARTIFICIAL MATERIALS FROM CELLULOSE, etc., manufacture.—W. W. Groves (I. G. Farbenindustrie). 3333.

NITRO DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 3334.

NITRILES, production.—W. W. Groves (I. G. Farbenindustrie). 3728.

MOLECULAR CONVERSION under presure of hydrocarbons, process. P. Guichard. (France, Feb. 2, '34.) 3268.

REFINING LEAD, process.—L. Gutlohn. (Austria, March 3, '34.) 5859.

AZO LAKES, ETC.—W. N. Headley. 3878.

WETTING AGENT for mercerising liquors.—I. G. Farbenindustrie. (Germany, Feb. 3, '34.) 3598.

AMINOPYRENE-SULPHONIC ACIDS, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 3, '34.) 3600.

POLYMERISED DRYING OILS, manufacture.—Imperial Chemical Industries, Ltd., E. W. Fawcett and M. W. Perrin. 3159.

PURIFYING, ETC., ORGANIC COMPOUNDS.—Imperial Chemical Industries, Ltd. 3397.

PENTAERYTHRITE, production.—Imperial Chemical Industries, Ltd., and T. R. Paterson. 3637.

DEXTROSE, manufacture.—International Patents Development Co. (United States, Feb. 2, '34.) 3584.

ESTERS, manufacture.—T. Kane and E. H. Strange. 3441.

AZEOTROPIC DRYING of alcohols, etc., apparatus.—L. Mellersh-Jackson. 3596.

CRUDE METHANOL, purification.—J. Y. Johnson (I. G. Farbenindustrie). 3192.

HYDROCARBONS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 3845.

HYDROCARBONS, colouring.—J. Y. Johnson (I. G. Farbenindustrie). 3846.

ALIPHATIC ALDEHYDES, etc., manufacture.—T. Kane and E. H. Strange. 3439.

ADDITION PRODUCTS of ethylene, manufacture.—T. Kane and E. H. Strange. 3440.

COMPOUNDS OF CYANINE TYPE, production.—J. D. Kendall. (May 8, '34.) 3223.

CERAMIC PRODUCTS, manufacture.—J. G. A. Lefranc. (France, Feb. 6, '34.) 3539.

LIQUID-OXYGEN EXPLOSIVES.—Lightfoot Refrigeration Co., Ltd., and A. E. Lance. 3840.

PENTAERYTHRITE, production.—Lonza Elektrizitätswerke und Chemische Fabriken A.-G. (Switzerland, Feb. 14, '34.) 3761.

CONDENSING SULPHURIC ACID from moist gases containing sulphur trioxide.—A. L. Mond. 3272.

MAGNESIUM-BASE ALLOYS.—A. J. Murphy. 3201.

ARTICLES of glass and plastic materials, manufacture.—Pilkington Bros., Ltd., and J. B. Forbes. 3841.

OZONE, production.—J. R. Quain and H. Harrison. 3505.

POLYHYDRIC ALCOHOL-POLYBASIC ACID TYPE RESINS.—I. Rosenblum. 3323.

QUATERNARY-AMMONIUM COMPOUNDS of benzimidazoles, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, Feb. 1, '34.) 3335. (Switzerland, April 26, '34.) 3336. (Switzerland, Dec. 15, '34.) 3337.

New Companies Registered

George Cockburn, Ltd., 19 Sterling Street, Aberdeen.—Registered February 2. Nominal capital £100. Manufacturers of and dealers in paints of all kinds, varnish, enamel, polish, lacquer, shellac, cellulose, size, pigments, compositions. Directors: George Cockburn, Norman Nicholson.

Effectol, Ltd.—Registered February 1. Nominal capital £50,000. To adopt an agreement with N. W. Holmes, M.P.S., for the acquisition of the trade mark "Effectol" and certain formulæ in connection with "Effectol" products and all other rights in such formulæ held by him. Chemists, druggists, drysalters, oil and colourmen, etc. Directors: Sir William Kay, Kt., 6, Oakes Avenue, West Didsbury, Manchester, Thomas H. Gillison, Nathaniel W. Holmes, Frederick Allwood, Tom Molyneux, Clifford W. Collinson.

Exeau Products, Ltd., 340 Leabridge Road, London.—Registered January 31. Nominal capital £500. Manufacturers and distributors of cement and other waterproofers, paints, stains, distempers, etc., to adopt an agreement with Thos. Parker. Directors: Geo. A. H. Trigg, Thos. Parker.

Johnson and Slater, Ltd.—Registered February 4. Nominal capital £375,000. Manufacturers and producers of and dealers in ceramic ware, bricks, tiles, pipes, china, clay, earth, terra cotta, glazes and glazed goods; coke manufacturers, chemists. Directors: John Slater, M.P., Stelvio Court, Eastbourne; Stanley Johnson, William E. Gurry, Benjamin T. Mayalnd, Otto F. Ahlmann.

London and Northern Chemicals, Ltd.—Registered February 9. Nominal capital of £100. Manufacturing chemists, manufacturers of and dealers in glues, gelatines, sizes, gums, dextrines, starches, distempers and adhesive products and substances of all kinds. A subscriber: Thomas H. Hazlem, 63 Carter Street, London, S.E.17.

Mathews, Maclay and Manson, Ltd., 138 Hyde Park Street, Glasgow.—Registered February 7. Nominal capital £14,000. To acquire the business of Mathews, Maclay and Manson, Glasgow, paint and varnish manufacturers. Directors: Henry S. Brewster, Robert Gray, John Fyfe.

St. Helens Colour and Varnish Co., Ltd., Victoria Works, Crossfield Street, St. Helens.—Registered February 8. Nominal capital £25,000. To acquire the business of paint, colour, varnish and bituminol manufacturers carried on by the "St. Helens Colour and Varnish Co.," St. Helens. Directors: George P. Else, William L. Else, Robert W. Else, William L. Else, junr.

R. J. Macnaughton (Chemists), Ltd.—Registered February 1. Nominal capital, £2,000. Retail and wholesale chemists and druggists, drysalters, oil and colour merchants, etc. A subscriber: Ronald J. Macnaughton, Shenley Road, Boreham Wood, Herts.

Remedial Products, Ltd., Africa House, Kingsway, London.—Registered January 30. Nominal capital £100. Wholesale and retail chemists, druggists, chemical and medical manufacturers, etc. Directors: Alexander Kowersky, Edgar A. Sanders.

Thawpit (Proprietary), Ltd., 155a Marlborough Road, London.—Registered February 4. Nominal capital £2,000. To adopt an agreement with Thawpit (1932), Ltd., and another; chemists, druggists, drysalters, oil and colourmen, importers and manufacturers of and dealers in pharmaceutical and other preparations, etc. A subscriber: Peggy A. Nisbet, 9 Victoria Grove Mews, Ossington Street, London.

The Ridgmont Fletton Brick Co., Ltd., 23 Lawrence Lane, Cheapside, London.—Registered February 7. Nominal capital £150,000. Brickmakers, manufacturers of tiles, pipes, pottery, earthenware, china, terra cotta and ceramic ware, paviors, manufacturers of and dealers in artificial stone for building, paving or other purposes, builders' merchants, manufacturing chemists. Directors: Arthur W. Allard, Duncan Whitehouse, Charles Brannan, Sydney A. Garner.

United Potash Co. (I.F.S.), Ltd.—Registered February 8. Nominal capital, £1,000. Chemists, importers, exporters, manufacturers and refiners of and dealers in chemical, industrial and other preparations and articles, potash, salts and fertilisers. A subscriber: George Ryce, Lucerne, 21 Palmerston Gardens, Rathmines, Dublin.

Prices of Chemical Products

The Week's Market Conditions

WITH the exceptions noted below the prices of chemical products remain as reported in THE CHEMICAL AGE last week (pp. 130-131). Unless otherwise stated the prices quoted cover fair quantities net and naked at sellers' works.

LONDON.—Chemicals continue to good general demand with prices steady and firm. Prices of coal tar products remain the same as last week. Pitch is quoted at about 42s. 6d. to 45s. per ton, f.o.b. East Coast port.

MANCHESTER.—Conditions have been rather patchy on the Manchester chemical market during the past week, both in respect of new bookings and of the movement into consumption of supplies against contracts booked some little time ago. In one or two cases, traders this week report having received further moderate orders for delivery over the next two or three months, but others have experienced quiet conditions in this respect, and somewhat similar irregularity has been in evidence in connection with deliveries against specifications. Better conditions in the cotton and wool textile industries are essential to any important upward movement in the demand for many descriptions of heavy chemicals and there is little indication of such an improvement in the near future. On the whole, however, there is a fairly steady call for contract deliveries of the alkalies and certain of the potash products, and conditions with regard to values are undeniably firm in most directions.

SCOTLAND.—There is little or no change taking place in the Scottish heavy chemical market.

General Chemicals

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £55 ex store.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £33 to £34; brown, £32.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £37 to £38.

SULPHATE OF COPPER.—MANCHESTER: £14 per ton f.o.b.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8¼d. per lb.; crude, 60's, 1s. 1½d. to s. ½d. per gal. MANCHESTER: Crystals, 7½d. to 7¾d. per lb.; crude, 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

CREOSOTE.—B.S.I. Specification standard, 5½d. to 5¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4¼d. f.o.r. North; 5d. London. MANCHESTER: 4¾d. to 5¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.

Perfumery Chemicals

ACETOPHENONE.—5s. 9d. per lb.
CITRONELLOL.—6s. 9d. per lb.
CITRAL.—8s. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—6s. per lb.
GERANIOL (Palmarosa).—13s. per lb.
GERANIOL.—4s. 9d. to 8s. per lb.
HELIOTROPINE.—7s. 6d. per lb.
ISO EUGENOL.—7s. 9d. per lb.
LINALOL (ex Bois de Rose).—8s. 6d. per lb.
LINALOL (ex Shui Oil).—4s. 9d. per lb.
LINALYL ACETATE (ex Bois de Rose).—10s. per lb.
LINALYL ACETATE (ex Shui Oil).—5s. 6d. per lb.
METHYL ANTHRANILATE.—7s. per lb.
PHENYL ETHYL ACETATE.—7s. 6d. per lb.

From Week to Week

MANSFIELD AND WYKES, LTD., have changed their name to Brampton Pharmacy, Ltd.

THE NEW OFFICES of the Rubber Growers' Association at 19 Fenchurch Street, London, were formally opened on February 7.

CHARLES TENNANT AND CO., LTD., Glasgow, has been appointed agents for Alcock (Peroxide), Ltd., Luton, for the sale of metasilicate of soda in Scotland.

BOOTS PURE DRUG CO. is to reduce its price for insulin from 1s. 4d. for a 5 c.c. phial of 100 units to 1s. At the same time the special low price charged to hospitals will be further reduced to a level substantially below that of imported insulin.

THE MEXICAN GOVERNMENT has cancelled all the concessions granted to the Aquila Oil Co. in 1906 in connection with petroleum, the reason for this cancellation is said to be that the concessions, as affecting the company's holdings of national lands, were unconstitutional and not in the best interests of the Republic.

THE CANADIAN DEPARMENT OF NATIONAL REVENUE announces that sheet cellulose acetate, in rolls, when imported into Canada by manufacturers of sensitised photographic film, for use exclusively in the manufacture of sensitised photographic film in their own factories will in future be admitted free of customs duties.

WHEN FIRE BROKE OUT on February 9 at the works of the Cornbrook Chemical Co., Ltd., Corporation Street, Stockport, large quantities of highly-inflammable pigments were threatened, but the fire brigade averted this danger, and had the outbreak under control within an hour. The fire originated in a drying stove in one of the sheds.

CORNWALL COUNTY COUNCIL invites tenders for the supply, during the year ending March 31, 1936, of refined tar, bitumen and cold emulsions, fuel and lubricating oils, grease, paints, tools, explosives, belting, bricks and cement, concrete and earthenware pipes, cast-iron pipes, etc., to be delivered to the Clerk, at the County Hall, Truro, by the first post on February 20.

A CONFIDENTIAL REPORT on markets for alums, aluminium sulphate and hydrogen peroxide in Brazil, based on information received from the Commercial Secretary to H.M. Embassy at Rio de Janeiro, has been issued by the Department to firms whose names are entered on its special register. United Kingdom firms desirous of obtaining a copy of the report should apply to the Department of Overseas Trade, 35 Old Queen Street, London, quoting reference number F.Y.2232.

A FIRE on February 9 at the premises of E. S. A. Robinson Waxed Paper Company, Ltd., Bristol, destroyed many tons of wax and a quantity of valuable machinery. The fire was discovered in a store of wax slabs at the rear of the factory. The flames quickly spread to the building, where a great deal of wax and rolls of paper were stored. Firemen, wearing smoke helmets, fought the outbreak amid thick clouds of black smoke, and four were overcome by fumes and taken to hospital. The blaze was put out after two hours' work.

MR. ERNEST BROWN, Secretary of Mines, on February 12 received a trade deputation which urged that in all new houses built in connection with any official scheme, provision should be made for the use of solid fuels. The deputation was introduced by Col. W. A. Bristow, President of the Low Temperature Coal Distillers' Association of Great Britain, and chairman of Low Temperature Carbonisation, Ltd. Mr. Brown said that the Ministry was completely in sympathy with the deputation, and he could assure them of whole-hearted support.

PNEUMATIC TYRES for modern transport were described in a lecture to the Aberdeen Institute of the Motor Trade by Mr. A. G. Perret, of the Dunlop Rubber Co., Ltd., Birmingham, at Aberdeen on February 6. Mr. Perret dealt with the factors in modern car design which were likely to reduce tyre life unless improvements were continuously effected by the tyre manufacturers to meet those more arduous conditions. He enlarged specifically on some of the factors which were at present presenting problems to tyre manufacturers, as for example, increased engine horse-power, the use of superchargers, the adoption of free-wheel devices, automatic gearboxes, and more efficient braking systems.

CHARLES JULIUS GLADITZ, 68, research chemist, Gunnersbury Avenue, Ealing, appeared at Ealing on February 7, on charges of forgery and fraud. The prosecution was concerned with the affairs of the New Process Co., Ltd., the directors of which, including Col. Hayley, Capt. Trafford, Sir Hugo Cunliffe-Owen, and Mr. Eric Hamilton Rose, were appointed with Gladitz to act for debenture holders, with Mr. Henry James Banes Feist as receiver and manager. Gladitz had an offer to sell the company's land for £6,500, and wrote to Sir Hugo Cunliffe-Owen and Mr. Rose that he had had an offer of £2,000, suggesting that it should be accepted. This was done. Gladitz put forward to Mr. Feist a document bearing the names of Capt. Trafford and Col. Hayley, and Mr. Feist was induced to sign without reading. It was further alleged that the same names had been forged on another conveyance Gladitz was remanded on bail, himself in £1,000 and two sureties of £500 each.

VICK CHEMICAL PRODUCTS (ENGLAND), LTD., changed their name to Valdic Chemical Products, Ltd., on January 29.

THE NOMINAL CAPITAL of Westminster Laboratories, Ltd., has been increased by the addition of £5,000 beyond the registered capital of £5,000.

THE NOMINAL CAPITAL of Starch Products, Ltd., has been increased by the addition of £5,000 beyond the registered capital of £15,000.

IMPERIAL CHEMICAL INDUSTRIES, LTD., states that the operation of the first hydrogenation unit of the Billingham petrol plant has begun successfully. Further units, including those operating directly on coal, will be brought into operation in the near future.

THE PAPER on "Recent Work on Chemistry in the Service of Medicine," by Dr. J. F. Wilkinson, which was to have been read in Manchester on February 14, has been postponed indefinitely on account of the lecturer's indisposition.

E. I. DU PONT DE NEMOURS AND CO. report for 1934 a consolidated net income of $46,701,000, compared with $38,895,000 for 1933. Both years include dividends from investments in General Motors Corporation, amounting to $15,000,000 and $12,500,000 respectively.

PLYMOUTH CITY COUNCIL invites tenders for the supply of gas mantles, disinfectants, cement, oils and petrol, etc. Tenders on forms provided have to be delivered to the Town Clerk, Mr. R. J. Fittall, at the Municipal Offices, not later than noon on February 27.

AN EXTRAORDINARY GENERAL MEETING of Courtaulds, Ltd., is being convened to follow the ordinary general meeting, which will be held on March 7 to raise the number of directors that can be appointed from 12 to 18. The board, which is already composed of the maximum number now permitted, desires to appoint at least one further director.

THE COTTON SPINNERS' AND MANUFACTURERS' ASSOCIATION, at its annual meeting in Manchester, on February 8, at which Mr. John H. Grey presided, responded to the appeal of the British Cotton Industry Research Association for more funds for the work at the Shirley Institute, Didsbury, by deciding to increase its contribution by 50 per cent.

A SERIOUS FIRE, causing damage running into thousands of pounds, broke out on February 10 at the Devonshire Works of the Staveley Coal and Iron Co., Ltd., at Staveley, Derbyshire. The fire started in the centre of the works, rapidly involved the whole of the tar plant, and spread to the naphthalene plant and pitch beds. The tar plant was destroyed. The works manager and another man were slightly burned by carbolic acid.

CORROSION TESTS carried out recently in America with a view to discovering the most economical material to resist sewage corrosive show that cast iron and steel are attacked from four to twenty times faster than Ni-Resist and that copper is attacked from two to three times faster. The resistance to wear offered by Ni-Resist also adds to its value for components subjected to abrasion such as occurs in pump valves, screw conveyors and scrapers.

FINAL FIGURES concerning the sugar beet campaign, just completed at the Brigg factory of the Second Lincolnshire Sugar Co., Ltd., show that 175,564 tons of beet were brought to the factory (in 1933 there were 139,760 tons) from which 26,173 tons of sugar was produced. The yield of 10.46 tons per acre (1933—9.29 tons) is considered very satisfactory, with the average sugar content at 17.073 (1933—17.049 per cent.), and dirt tares at 13.53 lb. to the cwt. The growers during the season have numbered 2,140 (1933—2,020). Hauliers have benefited to the extent of £50,000.

A DEVICE for abating the black smoke given off from furnaces has been tested at the Prince of Wales Spinning Mill, Oldham, and is now to be put on the market; known as the "Mellor smoke-burner," it has been invented by the chief engineer. In the new appliance the fire-hole door of the furnace consists of a solid plate having an air aperture provided through it in its upper half only, a cowl with open base at its inner side, and a three-sided canopy with open base at its outer side. The aperture, cowl, and canopy produce together a path for the air in the shape of an inverted U.

THE 29TH BEDSON LECTURE was delivered by Professor C. R. Harington at Armstrong College, Newcastle-on-Tyne, on February 8 to a large attendance, with Professor G. R. Clemo in the chair. Dr. Harington outlined the pathological changes found in goitre and cretinism, and the relationships of iodine deficiency to these diseases. He mentioned that following the successful treatment by Coindet in Geneva with iodine, that element was worn as a charm by a great many people until the serious symptoms of hyperthyroidism caused by excess caused the treatment to fall into disuse. Finally, he touched briefly upon the isolation of thyroxin, its investigation and synthesis, and concluded with his recent synthetic proof of its stereochemical similarity to 3:5 di-iodotyrozine which occurs within the gland, and also, it appears, built into a polypeptide, in the active secretion.

Forthcoming Events

LONDON

Feb. 19.—Institution of Petroleum Technologists (Students' Section). Annual general meeting. "Efficiency of Modern Distillation." R. H. Keach. 6.15 p.m. Aldine House, Bedford Street, Strand, London.

Feb. 20.—Institute of Chemistry (London Section). "A New Class of Synthetic Pigments." Dr. R. P. Linstead. 7.30 p.m. 30 Russell Square, London.

Feb. 20.—British Colour Council. Annual Dinner and Dance. Dorchester Hotel, London.

Feb. 21.—Chemical Society. 8 p.m. Burlington House, London.

Feb. 22.—Institution of Chemical Engineers. Thirteenth annual meeting and annual dinner. 11 a.m. and 7 p.m. Hotel Victoria, Northumberland Avenue, London.

Feb. 22.—Royal Institution. "Some Experiments in Gravitation and Magnetism." Professor A. O. Rankine. 9 p.m. 21 Albemarle Street, London, W.1.

BRADFORD

Feb. 21.—Society of Dyers and Colourists (West Riding Section). "New Discoveries relating to the Theory and Practice of Wool Dyeing." L. F. Rendell and Dr. H. A. Thomas. 7.30 p.m. Gt. Northern Victoria Hotel, Bradford.

BRISTOL

Feb. 18.—Institute of Chemistry (Bristol and S. Western Counties Section). "Modern Trends in the Manufacture of Sulphuric Acid." W. A. Damon.

BIRMINGHAM

Feb. 18.—Birmingham University Chemical Society. "The Use of Silica Gels." Professor S. Lees. 5 p.m. University, Birmingham.

DERBY

Feb. 20.—Society of Dyers and Colourists (Midlands Section). "Important Recent Research and its Application to Textile Processes." A. J. Hall. Derby.

Feb. 22.—Institute of Fuel (East Midland Section) and Institution of Mechanical Engineers. "The Evaluation of Coal for Steam Raising." Ernest S. Grumell. 7 p.m. Derby Technical College.

EDINBURGH

Feb. 19.—Society of Chemical Industry (Edinburgh) and Institute of Chemistry. "Laundering." A. P. Mieras. 7.30 p.m. North British Station Hotel, Princes Street, Edinburgh.

GLASGOW.

Feb. 18.—Institute of Metals (Scottish Section). "Recent Advances in Metallurgy." Dr. A. McCance. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Feb. 22.—Society of Dyers and Colourists (Scottish Section). "Recent Advances in Cellulose Derivatives." J. Craik. 7.15 p.m. Royal Technical College, Glasgow.

HULL

Feb. 19.—Hull Chemical and Engineering Society. "Micro Chemical Analysis by Colorimetric Methods." Norman Strafford. 7.45 p.m. Municipal Technical College, Park Street, Hull.

LEEDS

Feb. 18.—Institute of Chemistry (Leeds Area Section). "Advances in Colloid Chemistry." Dr. F. L. Usher. 7.30 p.m. University, Leeds.

LEICESTER

Feb. 20.—Leicester Literary and Philosophical Society (Chemistry Section). "The Methylation of Compounds of Arsenic and Selenium by Biological Processes." F. Challenger. 7.45 p.m. University College, University Road, Leicester.

MANCHESTER

Feb. 18.—Institute of Vitreous Enamellers (Northern Section). "Cast Iron for Vitreous Enamelling." J. W. Gardom. 7.30 p.m. Queen's Hotel, Piccadilly, Manchester.

Feb. 18.—Society of Chemical Industry (Manchester Section). Joint meeting with the Institution of the Rubber Industry and the Textile Institute. "The Physico-Chemical Properties of Latex and their Significance in Manufacture." A. W. Madge. 7 p.m. 17 Albert Square, Manchester.

NEWCASTLE-ON-TYNE

Feb. 20.—Institute of Chemistry (Newcastle-on-Tyne Section). "Modern Methods of Photography." Dr. L. A. Sayce.

SHEFFIELD

Feb. 20.—Society of Glass Technology. Ordinary general meeting. "The Analysis of Glass by the Treatment of Thin Film in the Autoclave," A. R. Wood; "The Influence of Some Batch Constituents on the Colour of Glass," E. J. C. Bowmaker; "An Investigation of Selenium Decolourising," E. J. Gooding and J. B. Murgatroyd. 2 p.m. University, Sheffield.

SWANSEA

Feb. 23.—Swansea Technical College Metallurgical Society. General meeting. "The Constitution of Basic Open Hearth Slags." Dr. R. Higgins. University College, Swansea.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Palestine (Tel-Aviv).—A firm of manufacturers' representatives desires to obtain the agency of a United Kingdom manufacturer of cement. (Ref. No. 151.)

Finland.—A firm of Helsingfors desire to represent United Kingdom exporters of industrial chemicals, including naphthalene, sulphide of sodium, hydrosulphite of sodium, and salt cake; china clay and turkey red oils. (Ref. No. 158.)

Morocco (French Zone).—H.M. Consul at Casablanca reports that the Pharmacie Centrale at Casablanca is calling for tenders, to be presented in Casablanca by March 6, 1935, for the supply of quinine, theobromine, antipyrine, acetylsalicylic acid and various other medicinal products. (Ref. F.Y. 2237.)

Company News

A. Boake, Roberts and Co.—A dividend of 1 per cent. is announced on the ordinary shares.

British Glues and Chemicals.—The half-year's dividend on the 8 per cent. cumulative participating preference shares, is announced, payable on March 1.

Inveresk Paper Co.—The payment is announced on March 1, of the full dividend on the 6 per cent. first preference stock for the year 1934. No dividend is being paid on the 6 per cent. second preference stock.

Reckitt and Sons.—The payment is announced of a quarterly dividend and interest on 4½ per cent. and 5 per cent. preference shares and 4 per cent. and 4¼ per cent. debenture stocks on April 1, 1935.

Southall Bros. and Barclay.—The report for the year to December 31, 1934, shows a profit of £83,360, compared with £80,708 in the previous year, after tax, directors' remuneration, depreciation, bonus £5,300 to staff, and £2,673 to pension fund. To this is added £17,753 brought forward, making £101,113. A final dividend of 6d. per share, tax free, making 1s. per share for the year is to be paid on larger capital to reserve, £40,000, leaving to carry forward, £22,113.

Shawinigan Water and Power Co.—The gross earnings for 1934 amounted to $12,504,406, compared with $11,945,863 in 1933. The net revenue before depreciation increased by 15 per cent., to $3,367,443, and after transfers to depreciation and contingency funds, the balance available before tax provision is equal to $1.04 per common share, against 83 cents last year. The profit and loss account shows that $1,700,000 has been charged to depreciation funds, $100,000 to contingent reserve and $499,526 to insurance reserve, leaving a surplus (subject to 1934 taxes) of $2,312,531.

Borax Consolidated, Ltd.—The total revenue for the year to September 30, 1934, amounted to £371,518, compared with £281,258 for the previous year, an increase of £90,260. Depreciation is allowed for to the extent of £50,000, against £40,000, and tax reserve and staff funds receive £10,000 and £5,000 respectively, against nothing last year. After providing for debenture interest, etc., the amount earned for dividend is £115,203, against £49,743 a year ago. A dividend of 2½ per cent. is to be paid on the deferred shares, the first since 7½ per cent. for 1928, and the preferred shares receive their 6 per cent. for the first time since 1929. The carry-forward is up from £207,934 to £214,387.

Voluntary Liquidation

Colour and Chemical Manufacturers

The statutory meeting of creditors of Smart and Worrall, Ltd., colour and chemical manufacturers, East Street, Manchester, was held at the offices of Harry L. Price and Co., 47 Mosley Street, Manchester, on February 5, when a statement of affairs was submitted which showed ranking liabilities of £456 18s. 6d., due to unsecured creditors. In addition the bank was scheduled for £348 10s. 6d., but its claim was not expected to rank. According to the books the assets totalled £883 9s. 2d., but they were only estimated to realise £235 15s. 3d. After allowing £15 1s. 8d., for preferential claims the net assets were £220 13s. 7d., or a deficiency, so far as the creditors were concerned, of £236 4s. 11d. The issued capital of the company was £440.

It was reported that the company was registered on January 26, 1934, with a nominal capital of £1,000, divided into shares of the face value of £1 each. The company took over an existing business, the purchase price being £339 5s. 4d. The deficiency was attributed to depreciation of the assets and a loss on trading since the commencement of rather more than £400.

Resolutions were passed confirming the voluntary liquidation of the company with Mr. A. T. Eaves, of Harry L. Price and Co., as liquidator.